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NAVAL ARCHITECTS AND MARINE ENGINEERS

At Friday afternoon's session of the Society of Naval Architects and Marine Engineers, D. H. Cox read Capt. C. A. McAllister's paper entitled, "Our New Revenue Cutters for Special Purposes." This paper will be published later.

DISCUSSION.

Robert S. Riley: In connection with the design of these vessels, they show a very careful study of the requirements, and it is noticed particularly that they are to be used for derelict destroyers, but one of their important functions will not be as destroyers, but as savers both of life and property, and one of the particulars mentioned is their ability as towing vessels, and it occurs to me one possible criticism of their design might be the omission of towing machines. It would seem that towing machines would add to their capacity in handling derelicts or other disabled vessels in heavy weather. They are very likely to be called on to render assistance of this kind, and that is the time when lines would be snapped unless they had some means for giving and taking in under the conditions they are likely to meet.

Spencer Miller: I am very sure we are indebted to Capt. McAllister for the very interesting paper which he has presented, and perhaps if there is any criticism to make of it is the fact that he has combined two papers in one. For the purpose of indexing, it seems it would be better if the paper had been divided into two parts, one part to be entitled "A Life Saving Tug," and the second part to be entitled "A Derelict Destroyer." The title that Capt. McAllister gives of "Two New Revenue Cutters for Spe-

cial Purposes," is not of great value in indexing; and whether or not the council or Capt. McAllister could in the proceedings divide the paper into two parts, with their separate titles, is not for me to say.

The breeches-buoy appliance which is referred to as being fitted to the life saving tug is something that is yet to be. Perhaps the society may be surprised to know how good a thing

breeches-buoy) that no passenger has ever begun the journey by the breeches-buoy through the most violent sea has ever failed to arrive on land alive. The majority of them got pretty wet, of course, and some of them arrive benumbed with the cold, and some of them are nearly drowned, but the facts are that no life has been lost in that way.

Now, there are a great many limi-



ILLUSTRATING SPENCER MILLER'S REMARKS IN THE APPLICATION OF THE MODERN CABLE-WAY FOR COALING SHIPS AT SEA TO THE SAVING OF LIFE.

the old fashioned, simple breeches-buoy apparatus is; that is to say, that which is in use along our coast. I know that at the time I was inquiring into it, I was very much surprised to learn that in the year 1906, last year, there were 189 passengers transported from wrecks to shore on the breeches-buoy. It is very remarkable that throughout the life saving service of the United States (and, by the way, I want to say there were 139 passengers in the United States alone transported from wrecks to shore by the use of the

tations of the use of the breeches-buoy. For instance, unless the wreck lies within a reasonable distance of the shore, it is impossible to establish communication, because logically the only way of establishing communication is by the line firing gun or rocket, although I believe recently there has been some invention for sending the line ashore by a small buoy with a sail. At any rate, the breeches-buoy will not operate at very long distances; therefore, if the wreck is at a considerable distance from the

shore, it is impossible to operate the breeches-buoy. Furthermore, unless the sea is particularly rough, they do not expect to use the breeches-buoy, but use the life boats; in fact, the records show that far more lives are saved by life boats than by the use of the breeches-buoy; therefore, when you realize the limitations of the breeches-buoy, it will be seen that it is remarkable that in a single year 189 lives should have been saved in this manner. We all remember, too, the experience of the steamer Berlin that was wrecked a year ago, I think, off the Hook of Holland. That ship was so far from the shore that no breeches-buoy could reach it. The sea was so tempestuous that no life boat could live in it. A ship was actually sent outside to render assistance, and breeches-buoys were carried, and the lines were actually rigged up between the wreck and this ship. Of course, what happened can naturally be surmised. The lines snapped as fast as they could put them out. Capt. McAllister has said, therefore, that the breeches-buoy appliance which is to be applied to this life saving craft is a modification of the modern cableway for coaling warships at sea. Perhaps that is one way to put it; perhaps it would be better to say that this appliance will be a common coast breeches-buoy, plus an automatic reel. The automatic reel will be placed in the engine room, to which the ends of the hawser will be carried, and the upper line of which will be coiled on the reel. This reel will automatically take in the rope as fast as required, and pay it out as fast as demanded. Whether the ship be moving by the motion of the waves, or by any other means, it is the function of this reel to take in and pay out this rope, and this function is to maintain a uniform tension in the line, which means, of course, a uniform deflection at the same time, permitting the length of the line to vary at will. This is under construction, and tests have been made already to establish the entire feasibility of the plan. Fifteen hundred feet of the hawser—I may use the term hawser, because that is the term by which the upper or elevated line is known along the coast—1,500 feet of this hawser will be always present on the reel. The distance, therefore, can vary anywhere from 200 to 300 ft., or to 1,000 or 1,200 ft. If there is deep water in the vicinity of the wreck, logically they will get near it; if it is shallow water they will have to remain at a considerable distance. It is not for one moment expected that the passengers will arrive any

drier than they do at present. It is also evident if the sea is not particularly rough, the breeches-buoy apparatus will not be required at all, because the life boat will then be launched. It is only, therefore, under the conditions where everything else is not to be thought of that the breeches-buoy will come into use.

The reasons why this apparatus was offered was because of the experience had with the marine cableway in coaling warships at sea. And in these experiments it is rather remarkable that the behavior of the machinery, the operation of the conveyor, has been proven to be identical in a rough sea as in a smooth sea.

If I may be permitted to reminisce, I will say I was a passenger on the Massachusetts at the time it coaled from the first marine cableway at sea. There were five sea trials. The fifth was a rough weather test. The sea was so rough that I proposed to the captain that the apparatus had not been built for that purpose. The contract calls for a moderate sea, and if he attempted to set the apparatus up in such a heavy sea the company would not be responsible for what might happen. Capt. Crane answered, "Oh, let us try it and see what happens." What happened is on the record in the proceedings of this society. Capt. Crane himself came to tell the story to this society, and what he said was that in this heavy sea the apparatus worked with greater precision and with greater capacity than it had on any previous days when the sea was smooth. The trial at England took place in over a half gale of wind. The trials at Italy took place when the ship coaled, was showing her screws to the collier. It was these things, it was these experiences, that have led to the attempt to build a device for life saving, and it is perhaps rather a source of congratulation that a device which was primarily invented to make a battleship an engine of destruction, more efficient, that a modification of it should be taken to save life in the wildest ocean.

COMMUNICATED DISCUSSION.

Col. E. A. Stevens: I would ask Mr. Miller whether it would not be possible to bend a tackle on to a towing hawser, lead the hauling end of falls to the marine cableway engine and make the tail block fast to the towing bitts. If this is done, will not the engine give the requisite spring to the towing hawser to make it work satisfactorily in a heavy sea?

The President: Are there any further remarks to be made on this pa-

per? If not, the discussion will be closed.

TWO INSTANCES OF UNUSUAL REPAIRS TO VESSELS.

Assistant Naval Constructor Furer then read Assistant Naval Constructor W. B. Ferguson's paper entitled "Two Instances of Unusual Repairs to Vessels." It is doubtful if the repairs indicated (to the bottom of the collier Nero after grounding, and renewing sheathing on the Fire Island lightship, due to action of electrolysis) impressed experienced ship builders as at all unusual; in fact, they appeared to be quite in the usual run of ordinary practice.

DISCUSSION.

William McEntee: I think there is one point of interest in connection with the sketch showing the way in which the floors and frames buckled. A similar thing is seen in the case of the army transport Sheridan, now in the dock at Mare island. It appears that the inner bottom of the reverse frames were very little, if any, distorted. All of the distortion occurred with the outer frames and the floor plates, thus indicating that the framing, considered as beaming, was much weaker for local stress than for beaming, pure and simple; that is to say, a load applied to any particular point would buckle the beam locally, but bend it as a beam. This is of interest, also, in connection with the disaster which occurred to the Quebec bridge, which seemed to have failed in about the same way. In that case, though, it was a girder. The deep beams secured on the edges to form a column failed by the buckling of the web.

R. R. Row: I noticed carefully the remarks that were made in connection with light vessel No. 68, but I should like very much to hear from Assistant Naval Constructor Ferguson regarding the condition of the frames and the tie-plates, what effect the deterioration of the steel or iron bolts had on that, because I know that the repairs were made and the novel brass bolts replaced. I should think it might have some effect, the galvanic action, in replacing a composition bolt, and putting a composition bolt in place of the iron bolt or steel bolt.

F. L. DuBosque: The gentleman who has just spoken anticipated what I was going to say. The fact that this vessel, single sheathed, has had the single sheathing fastened to its frame by composition bolts comes to those with experience with considerable surprise, and as it has not, apparently, received the sanction of the bureau of

construction and repairs, we look upon it as a serious mistake.

There is no doubt at all, in fact it has been known for a number of years, that a single-sheathed vessel, where the sheathing is fastened with iron bolts, and where copper is used to prevent corrosion, that the fastenings will soon corrode, eat away, and the planking become loose. To fasten the sheathing with brass composition leads to the thought at once that while you protect the bolts, you very soon commence to destroy the frame of the ship, and I should not be surprised to have this gentleman write us a paper in the course of a few years describing how the frame of this vessel has been almost entirely eaten away in the vicinity of the fastenings. The cure for this lies in an entirely different direction. The copper sheathing coming into the market now is not at all durable, and usually does not last on wooden vessels for more than two or three years, so the conclusion reached by those who have had experience with sheathing vessels is that the most economical plan is to fasten the sheathing with iron bolts, as heretofore, and put galvanized iron on the outside of the vessel instead of copper. Of course, we recognize galvanized iron is not as durable, and does not present as smooth a bottom as copper, but it will last for one or two years, and when the relative expense of repair and maintenance are taken into consideration, it is cheaper than copper sheathing of the character now received.

R. R. Row: In speaking of the deterioration of iron and steel bolts, I remember about six or seven years ago I had charge of a small ship yard, and we hauled a steel hull light vessel on the railway, and in the area of the skin connections, we found, instead of the plates chipping, that the countersunk heads of the rivets had carbonized, and I remember an instance where I took a knife and cut them out, and the only thing by which we could account for that condition in that case was that, being in close proximity to the composition, they formed a galvanic action, owing to the high property of sulphur and phosphorus in the rivets. Everything was intact on the inner portion of the ship, but outside of the skin of the ship we could just cut them out, and we drove between 700 and 800 rivets, but it did not affect the shell, and that was my reason for asking particularly what effect it had on the real structure of the vessel in the area of the framing and tie-plates.

Julius A. Furer: Relative to the comment about sheathing a vessel with galvanized iron, it is my understanding that these vessels are sheathed with composition more to prevent fouling than for any other purpose. Of course, in the case of a light vessel, which is not under way very much, some of them very little, it may not be very important to prevent fouling. But I understand that the gentleman referred to the ordinary practice of sheathing vessels, and I think it would be interesting to hear as to the results obtained in preventing fouling by the use of galvanized iron.

William McEntee: Apropos of the comments about the use of composition bolts for securing the sheathing, there was an incident occurred at Mare Island about three years ago which might be of some interest in that connection. The cruiser *New Orleans* was docked, and she is sheathed with teak, over the complete shell and all, about $\frac{3}{8}$ -in. steel plate, and I noticed on one of the plans in connection with some of the valves that the composition wool casting was shown connected direct to the steel plate of the interior. As I understand that to be bad practice, I thought that the plan was out, and went down and examined it and found it true, that the composition casting which went through the sheathing was connected to the outer and inner beams directly to the steel plates. Finding this to be the case, I looked with much curiosity for corrosion, and found none around any of the composition casting; some of the sheathing was also removed from the steel plate, underneath the steel plate, and found to be in excellent condition.

William Hoygaard: I have no experience in the use of galvanized iron for sheathing, but as is well known, zinc sheathing has been so used in several cases, and the result was, I believe, that it is not so effective as copper in preventing fouling. The effect of galvanized iron would, in this respect, of course, be the same, but I should think that the thin layer of zinc would soon be eaten away, and the iron then exposed to corrosion and fouling.

W. J. Baxter: The question is not one, as I understand it, of sheathing or not sheathing. This is a statement of certain results which have been produced by a certain method of fastening the ship. I happen to know that the frame of this particular ship was not injured in any way. It was quite true, that with this particular sheathing and composition bolts of one kind

and another, the frames may deteriorate, but when these frames deteriorate, if the ship is properly inspected that deterioration can be seen, watched and remedied. With the galvanized fastening the deterioration goes on, it is impossible to see it, and a great disaster might result from a very small blow. When a ship's frame is fastened, or is not fastened, as we have seen from these figures, which are merely representative bolts, imagine what might occur should that vessel receive any shock in these waters.

The merits of various kinds of sheathing I will not attempt to speak of; I simply wanted to answer that one question about the results of the iron bolting on the steel frames, they were not touched at all, not injured at all.

F. L. DuBosque: I feel called on to make a few further remarks in connection with this subject. I know of cases that have come to my notice, and a great many of them, where the frames have been attacked, where iron bolts have been used to fasten the sheathing to the frames, and the reason of that is very apparent. The galvanic action which is set up between the copper outside the sheathing, and the nearest thing to it, attacks the first place it can, and the bolts give sufficient material to be attacked until they are entirely eaten away.

In reply to Mr. Baxter, I would say that this matter comes closer to my attention today, because I have on my desk a number of samples of bolts taken out of a sheathed vessel a few days ago. Some of these bolts are in two parts, they are so thoroughly eaten away that the head had separated from the shank, and my first surprise was that the sheathing remained on this boat at all. The answer to that seems to be that here and there through the planking there seems to be enough fastening to hold the planking to its shape and the calking of the planking does the rest. In this particular case the vessel was subject to more shock than any naval vessel would be called upon to endure, because this ship is used in towing service 10 hours out of the 24 every day, bumping up against the sides of heavy craft which she was towing. I make no claim for the durability of galvanized iron sheathing, but I claim it is the least expensive of the two kinds, very much less expensive than copper. It is quite as durable as zinc sheathing, for zinc sheathing will last no longer on the bottom of a boat than galvanized iron, as we know

from experience. There is no doubt that the iron becomes corroded after six or eight months' application, and we think we are justified in renewing the galvanized iron sheathing after 16 or 18 months, which is our practice, and even that practice is much cheaper than using copper.

The President: Mr. Furer, have you anything further to say in reply?

Julius A. Furer: It may be of interest to say in connection with the repairs to the *Nero* that the vessel, now in service, has been a collier for almost a year again, and the repairs are entirely satisfactory. Of course, as mentioned in the paper, no attempt was made to secure water-tight construction, as in the case of new construction, and the tanks were tested for ordinary water tanks, but the vessel has been perfectly satisfactory so far.

Spencer Miller: I move a vote of thanks to Mr. Ferguson for his very interesting paper.

The President: The motion is welcomed by the chair; those in favor of extending a vote of thanks to the author of this paper will say aye; contrary minded, no. The motion is carried.

WOODEN SAILING SHIPS.

Prof. H. C. Sadler next read B. B. Crowninshield's paper entitled "Wooden Sailing Ships." Attention will be paid to this paper later.

COMMUNICATED DISCUSSION.

Thomas Amory De Blois, M. D., late lieutenant United States navy: I cannot express how pleased I am with Mr. Crowninshield's paper, bringing back to us the remembrance of the beautiful white sails of the past. I show a photograph of a model of a "two-decker" of the sixteenth century. This model was in the museum of the old naval academy and appears to have some form of submarine defensive armor. She was a Venetian vessel and is rigged to sky sails, as will be observed. Having lived for three years aboard the old frigate *Constitution*, I have been greatly interested in her restoration. If I mistake not, in 1863, although her lower yards were rigged with chain slings, she still had the "rove" hemp trusses, which had to be slacked up whenever the yards were braced "sharp up" on the other tack. The cause of the old order in tacking ship: "Rise tacks and sheets, let go, and overhaul your weather lifts and trusses, bear abast your weather backstays" (referring to the breast backstays). All this had to be done to brace the lower yards "sharp up."

When the iron truss came in, it set

far enough out from the lower mast to keep the yard clear of the lower shrouds. I enclose a photograph of the frigate *Santee*, a newer ship than the *Constitution*, and one which the mistake was made of piercing the spar deck ports directly over those of the gun deck. This weakened the ship and made it unpleasant to load the gun deck battery while those above were being fired.

The sloop of war (gun deck sloop, i. e., with covered gun deck) was a beautiful type of the later "razeed" frigate. This was done to several when the guns became heavier (9-in. smooth bore), the spar deck battery was abandoned and the hammock rail was lowered. I enclose photograph of the U. S. S. *Macedonian*, one of the best of those, and a beautiful working ship she was.

Soon there followed the full-rigged sloop and frigate with hoisting propeller, and steam power of about six knots. The propeller was two bladed and the enclosing frame hoisted in a well, clear of the water.

Abroad the United States sloop of war *Brooklyn*, in 1870, the propeller jammed while being hoisted and the sheaves were torn out of the propeller frame. The frame was then wedged down with crossed scantling in the propeller well, the shaft was uncoupled and dragging the propeller we sailed from Sandy Hook to Libson in 31 days.

I miss the name of Steers in this account of our beautiful American sailing ships. Besides designing the yacht *America*, he designed for the navy the frigate *Niagara* (which laid the first cable) and the sloop of war *Lancaster*, known as "the man-of-war yacht," the most beautiful vessel the navy has ever known. I enclose a photograph showing the beautiful lines of the *America* when "hove down" to a monitor in the Severn river at Annapolis.

I cannot finish these remarks without speaking of the pains our government once took to procure and preserve good building material for its wooden navy. In 1875 and 1876 I inspected the fresh water ponds on the "naval reserve" at Pensacola navy yard. Here two frigate frames of live stock had been laid down under water, long before the war of the rebellion. In the winter of 1876 a contractor came down from Washington, employed a lot of men and two more sets of frames were laid down under the water (pegged and weighted when necessary). Now whether this beautiful material was "sold for a song," or whether it still lies in the sand, waiting to be fully seasoned by the

"day of judgment" (for it will never rot under water) I know not.

DISCUSSION.

The President: This paper is now open for general discussion.

Col. E. A. Stevens: I trust that when Mr. Crowninshield's paper is published, the lines of the *Ann McKim* will not be omitted, as they have been in the advance copy. I join with Mr. Crowninshield in his admiration of the lines of that vessel, and I think it will be an admirable record for us to have it in relation to the speed of sailing ships which he mentions. I am sorry he forgot the *Sappho*. It was, of course, a considerably smaller vessel than the clipper ships, like the *Sovereign of the Sea*, but the *Sappho* maintained something over 16 knots for a continuous run for a number of hours. That was during her famous trip in which she lowered the then sailing ship record between New York and Great Britain. I can remember as a boy watching a contrivance on board the *Maria*, to indicate the speed by balancing the head pressure of the water against a column of mercury. It stood on the aft side of the foremast. The apparatus has been standardized by the ordinary ship block, which was the only thing available in those days, and I can remember seeing that log indicating between 14 and 15 knots. The tradition was that at one time she went a little over 17 knots between New London and Newport. That was before my day. There was no doubt at all, however, that the old saying among seagoing men that a sailing ship could under favorable conditions, attain the speed of the steam ship, was true until the advent of the recent high speed vessels. Of course, the conditions had to be favorable, and the ships which were able to attain the high speed, the high record speed, were not necessarily the fastest ships under all conditions, in fact, very high speed was generally the result of sacrificing those qualities which would give them the highest average speed.

The President: I was wondering how long the fore and aft schooners were going to be used in trade?

W. F. Palmer. Mr. President, they will continue just as long as you have a steel trust that charges you the present price of steel, and in addition pretends to regulate the movements of the sun and stars, and the finances of the nation. I, for business reasons, feel somewhat tongue-tied about saying what is much in

my mind along that line, but it so happens that I have some 15 or 16 of these crafts, which this year will show an average earning and dividend to their owners of perhaps 22 per cent on their cost. I do not believe any fleet of steamers in the United States will show the same record. Those of us who build ships for money, and design our own ships, and raise the money with which to build them, have to furnish dividends for our owners, and we have a treble problem. The steamer usually has only one problem, which is settled by the young fellows just out of a technical school, and who sit around and spend millions of money, wasting their energies and other people's money over the drafting board, but some of us have to build ships and run them for money, and I think that is the real test of the usefulness of a ship.

Now, Mr. President, they will continue to build these fore and aft schooners just as long as hard pine grows on the hill. We have not begun to touch it. After we are all dead they will be still having some type of fore and aft vessel, large vessels, fitted for the coastwise trade. Then, too, there is just this thing to remember. We have learned through all these generations, in the evolution of that type of craft, how to preserve material. These ships last longer than ever they did, and meanwhile with the higher tensile strength of steel comes its shorter life, so that in point of age, the wooden vessel and the steel vessel are approximate. The percentage which you charge off each year for depreciation, the figures contained in the percentage of depreciation, that is the thing not to be forgotten.

Just a word further about this supply of hard pine which is the chief material we use today. It looks to me as though there will be aplenty for 50 years. They still grow oak frames in Virginia, enormous big oak frames, four of them in a tree, 17 by 17, and sometimes 18 by 18, and a large ship takes about 600 tons, or 40 cubic ft. of these frames. There is another thing about these vessels. We build them with about three times as much timber as they should have, to provide for their decay, knowing there may come a time, perhaps in 10 years, when one rib in three will have to furnish the strength, and we provide to have it adequate. There is another thing about these ships, they have grown and evolved until they are today in an almost perfect condi-

tion. Your fathers, your grandfathers, and your great grandfathers, were engaged in that line of marine work. They have perfected a great many things. In a great many of the steamers, you see all sort of crudities, in vessels of this type, and it would seem as if the owners are content to have some young fellow with his suspenders over his breeches design their ships and build them for them. I object to that kind of work with any ships in which I am interested. The minute a man gets fit for his work he goes to something else, and the aforesaid young fellow, with his suspenders over his breeches, makes the designs for ships. That would not do if you competed with us, you could not compete with us. We have it attended to in a better way. Once more, if there is such a thing as scholarly respect for the evolution of ages, and for the breed of an animal to fit his perfect conditions, I say that these large fore and aft vessels are very nearly to the limit of present conditions of material. We have heard some wonderful stories here about the speed of well-known ships. I have some 15 or 16 captains who bring in these yarns to me, and I have watched the coming and the going of vessels, in both the coastwise and foreign trade. The best yarn I can vouch for is that of 15 knots for five hours in succession, but as some one has suggested in this discussion, it is not the fastest vessel which is necessarily the most profitable vessel in making these runs. We build ships for money, we build them for their average dividend. I submit, as long as these are vessels of commerce and not war vessels, nor racing vessels, that they shall be judged by the rate of return they make to a limited period of time, and on that basis they still fly their flag clear to the royal truck.

The President: I should like a few comments to be made on the steam collier.

Mr. Palmer: Just along that line, as to the steam collier, in which you are interested. These same wooden vessels have filled every form of steamer transportation, with which they have been brought in competition. We can live and pay dividends with these wooden vessels, when the iron steamers cannot earn their salt. The proof of this is a long period of years in which we have been doing just that thing. I do not say it will last forever. I do not know when conditions will change, but I believe their usefulness will remain unim-

paired in that direction for many years to come. Of course, I recognize if we could build ships as they do on the Clyde, with the price for labor and material which applies in that place, it might be an altogether different thing, at all events, I should instantly begin the building of steel vessels right today, or tomorrow, if the circumstances warranted.

Let us see what we have had in recent times along the line of these steel colliers. We have one large company in Boston that built a lot of them. They were immediately taken out of competition with us, and put into the Pacific trade. The largest concern which has built these steam colliers has stated over and over again the impossibility of competing with these large fore and aft sailing vessels under their conditions. Now, these conditions are peculiar. It is in the nature of a distinction between hay and grass. In the case of a steel collier carrying 7,000 tons or 10,000 tons, if you can always have the dock ready, and get a passage, have the cargo ready, of course in such a case as that there is no such thing as competition with steam colliers by the wooden vessels. When, however, the cargo is not ready and the steamer has to wait for her berth, and there are other troubles and annoyances arise, so that she is delayed, then costing so much to build, and costing so much to operate, the fore and aft schooner will be more profitable on the whole. Now, when this delay becomes very excessive and the vessel has to lie out over night waiting for her load, or her discharge, then the schooner is just between the steamer and the barge. We are now witnessing in the last days of one of the most magnificent characters in this country, the failure probably of a great dream, to take coal from the mines to the docks, holding the transportation facilities, the docks at both ends, and the steamer—to take the coal by one process all the way from the mine to the gas jet of a very large portion of our country. The man who has endeavored to do that shall be without name, we all know him, and we all know that his gigantic fortune is probably going to be much wasted in the endeavor to carry out that problem, if, indeed, it does not go down in final defeat, and for this reason, that the fog will go against the steamer and if you run six of them together, you must slow down. The northeastern gale still comes around Cape Cod, and we must remember that the fog still impedes

the progress of the steamer. You cannot run her at full speed against the northeastern gales, around Cape Cod, or if you do, she breaks her rivets, and comes back to you for repairs, you have got to slow the steamer down, and that throws the schedule out of gear; it is like a double track railroad which has reached its maximum, one express train out of schedule throws the whole line out of gear, and one steamer like that throws the docks all out of arrangement, and everything is thrown askew. That is just the problem that is coming on these steamers. It is that single feature that probably has not been taken into account that will cause the failure of this great attempt to move the mines through one process straight to the gas jets or the gas engines in our big cities in the east.

F. L. DuBosque: It is presumption perhaps, for a man who must express himself in such humble words as I may command, to rise to speak after the eloquence we have just heard, but there are a few pertinent questions which should be asked, inasmuch as the remarks which have just preceded will go into our records. I ask, first, if the gentleman has a son, has he sent him to college to be educated, or is he bringing him up in the hard and fast way in which he was brought up? Secondly, does the gentleman recognize that nine-tenths of the coal transported along our coast is being transported by steam? Thirdly, has he ever been in Norfolk and seen his sailing ships anchored in the stream, while vessels propelled by steam or towed are at the docks and having their bunkers filled? Such questions as these are a little more practical and should enter upon our records.

W. F. Palmer: I ask the courtesy of the floor, to make a brief reply to the remarks just made. Our ships are under the common law of carriers. We are joined together in what is known as the Atlantic Carriers' Association and we get absolute turn in loading and unloading. The penalty for violation is all written in the charter. We have met the president of the Norfolk & Western Railroad Co., here in the city, at his own request, and he asked us not to bring suit. I brought a suit—it was fought out in the United States courts—in the celebrated Chesapeake & Ohio railroad case, in which the doctrine was laid down from the bench that no transportation company could give any preference to any ship engaged in transportation. The theory on

which a steamer would get in ahead of one of my ships, would be ridiculous, and I should appeal to the courts immediately. That is part of the case on record, naturally, the steamers do not like this, to have a little sailing vessel to take their place, and have the steamer wait until their sailing vessel is docked. It is cheaper for them to put in the steamer and pay for any delay which might be occasioned to the sailing vessel. But so far as law of gravitation, or anything else, is concerned, which will allow a steamer to go in ahead of a sailing vessel, without paying for it, that idea violates every word of the common law which has existed for over three hundred years.

F. L. DuBosque: I am glad the gentleman recognizes that what I said are facts.

The President: I hope to see the day not far distant when I will be out of this chair, and be more or less free to express the opinion I have upon the subjects in which I am interested. I try hard to carry an even keel here, but it is very difficult at times, particularly now. With regard to the transportation of coal on the Atlantic coast, I believe that the methods that are followed are as inadequate as the Constitution. I believe that the wooden schooner is a weight around the neck of the industries of New England today. But I want to suggest to the gentleman whose industry and whose capacity for his business I admire, as many others do, if he would think of undertaking today to manage the traffic of the great lakes with his wide fore and aft schooner?

EARLY HISTORY OF MONITORS.

W. I. Power's paper entitled "Some Early History Regarding the Double-Turreted Monitors Miantonomoh and Class," was then read by the secretary.

COMMUNICATED DISCUSSION.

W. A. Dobson, Esq., naval architect at Cramps: "Having been associated with Mr. Powell for a number of years in the preparation of the designs for the earlier vessels of the new navy, it gives me pleasure to bear witness to the deep interest he manifested in all matters pertaining to the construction of war vessels, and to the self sacrifice that this interest often imposed upon him. In fact this work before us was entirely a labor of love and was done in Mr. Powell's own time. In these days of planimeters and integrators, the amount of work involved in such a set of calculations is comparatively small, but at the time

this work was done the task was indeed a formidable one, involving the use of wedges of emersion and immersion, with the careful adjustment of their centers, etc. Anyone that has waded through an experience of this sort can appreciate the work and headaches involved, others can thank God for Dr. Amsler.

As a very young man I had worked upon the plans of the Miantonomoh at the ship yard of John Roach. Mr. Powell being aware of the fact took occasion to show me, while calling upon him at his home in Washington, in the winter of 1880, the work he had done and the result as plotted, a part of which lies before you.

Insofar as I am aware this was the first set of complete stability calculations made in this country for other than experimental work. If my memory serves me aright Irving Babcock made some similar investigations concerning the stability of a merchant vessel, at a somewhat later date.

It is very gratifying that Mr. Powell has felt impelled to put upon record in the annals of our society this history of careful investigation which goes very far to refute the careless statements often made that the ships of the old navy were the result of the Jack plane and rule of thumb.

Adjournment was then taken for one year.

PROPELLED BY GASOLINE ENGINE.

On the last day of November an oil carrier, built by the Union Iron Works of San Francisco for the Standard Oil Co., was launched at the Potrero, Bay of San Francisco. Miss Bishopburger christened the vessel Contra Costa. The vessel cost about \$100,000 and is the largest craft afloat that is propelled by gasoline engines. She has twin screws, two gasoline engines of 300 H. P. and a speed of 11 knots per hour. The dynamo, the windlass, winch and pump engines are all of the explosive motor type. The Contra Costa will be used for carrying oil round San Francisco Bay and as far south as Half Moon Bay. If necessary, she can be used for coasting. She is fitted to accommodate a crew of 14 men.

The C. F. Harms Co., 140 Broad street, New York, have just issued a calendar which is quite valuable to navigators as it indicates high water at Sandy Hook, Governor's Island and Hell Gate. Incidentally their lightering and towage business is advertised.

SUMMARY OF NAVAL CONSTRUCTION.

The summary of naval construction, issued by the bureau of construction and repair, shows the usual rate of progress upon naval vessels. The Fore River Ship Building Co. seems to be making a little better time upon the North Dakota than the Newport News Ship Building Co. is making upon the Delaware. Following is the summary:

Name of Vessel.	Building at--	--1907--	
		Per cent of completion. Nov. 1.	Dec. 1.
BATTLESHIPS.			
Mississippi	Wm. Cramp & Sons.....	96.82	98.91
Idaho	Wm. Cramp & Sons.....	89.41	91.24
New Hampshire	New York S. B. Co.....	90.20	93.10
South Carolina	Wm. Cramp & Sons.....	28.83	31.68
Michigan	New York S. B. Co.....	29.10	33.50
Delaware	Newport News S. B. Co.....	2.33	5.08
North Dakota	Fore River S. B. Co.....	4.23	7.84
ARMORED CRUISERS.			
North Carolina	Newport News S. B. Co.....	93.33	95.17
Montana	Newport News S. B. Co.....	87.38	89.49
SCOUT CRUISERS.			
Chester	Bath Iron Works.....	92.70	94.00
Birmingham	Fore River S. B. Co.....	90.79	91.88
Salem	Fore River S. B. Co.....	88.52	90.29
TORPEDO BOAT DESTROYERS.			
T. B. Destroyer No. 17.....	Wm. Cramp & Sons.....	00.00	00.00
T. B. Destroyer No. 18.....	Wm. Cramp & Sons.....	00.00	00.00
T. B. Destroyer No. 19.....	New York S. B. Co.....	00.00	00.00
T. B. Destroyer No. 20.....	Bath Iron Works.....	00.00	00.00
T. B. Destroyer No. 21.....	Bath Iron Works.....	00.00	00.00
SUBMARINE TORPEDO BOATS.			
Submarine T. B. No. 9.....	Fore River S. B. Co.....	99.00	99.00
Submarine T. B. No. 12.....	Fore River S. B. Co.....	99.00	99.00
COLLIERS.			
Vestal	Navy Yard, New York.....	52.70	55.30
Prometheus	Navy Yard, Mare Island.....	6.60	19.60
TUG BOATS.			
Patapsco	Navy Yard, Portsmouth.....	28.00	31.00
Patuxent	Navy Yard, Norfolk.....	27.00	27.00

*Delivered at Naval Torpedo Station, Newport, R. I., Nov. 29, 1907.

MARE ISLAND NAVY YARD.

The approaching visit of the battleship fleet of the United States navy to the Pacific coast has caused an agitation for another naval station, in addition to the one already at Mare Island, on San Francisco Bay. It is said that the creation of a new naval station would not cause the abandonment of the Mare Island yard, which has cost \$17,000,000, and will always be in demand for work on small vessels. The present site of the Mare Island navy yard was selected in 1851-2 by a board of which Commodore Sloat was a member, and Senator Perkins, of California, who has been on the naval affairs committee for 14 years and has always advocated the improvement of Mare Island, says that there is no better site in the United States. There is a 28-ft. channel and the yard is excellently equipped for making repairs

and general ship building. The advocates of a new station say that two docks can be built on deep water, where foundations are not necessary, for \$2,000,000.

The secretary of the navy and the chiefs of the bureau are opposed to the scheme of creating a new station and in favor of improving Mare Island. When the water in Mare Island straits is backed up by the flood tide,

that the company will now install power in the schooner Woodbury.

The United Engineering Works, San Francisco, Cal., was awarded the contract for repairing the former lake steamer Winnebago, which was damaged while passing through the Welland canal on her way to the Pacific coast.

Palmer & Son, Noank, Conn., are building six barges, for the coal carrying trade, two railroad floats, and six cotton lighters, besides having contracts for a large amount of repair work.

The Risdon Iron Works, San Francisco, Cal., was the successful bidder for repairing the army transport Logan. The work is to be completed within a period of 182 days and will be done at a cost of \$194,057.

The Maryland Steel Co., Sparrow's Point, Md., has the side wheel steamer Lancaster, owned by the Maryland, Delaware & Virginia railway, at its yard for repairs to the main shaft and starboard wheel.

The Maryland Steel Co., Sparrow's Point, Md., is rebuilding the steamer Alabama, owned by the Baltimore Steam Packet Co., adding 30 state-rooms and extending her saloon decks further aft.

The Gas Engine & Power Co. and Charles L. Seabury & Co., Morris Heights, N. Y., have recently been awarded contract by Charles H. Fletcher for a cruising yacht to be 111 ft. long, 21 ft. beam and 4 ft. draught. She will be powered with two gasoline motors giving her a speed of 12 miles an hour.

The Fore River Ship Building Co., Quincy, Mass., launched Transfer Tug No. 21, building for the New England Steamship Co., on Dec. 11. This tug is 111 ft. 10½ in. long, 26 ft. beam and 14½ ft. deep and is fitted with the most modern appliances.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., is putting the finishing touches upon the three-masted vessel George W. Fenwick, built to the order of the Hammond Lumber Co., of San Francisco, Cal. She is of 3,000 gross tons.

The Heath Ship Yard, Tacoma, Wash., is getting out the new tug for the Merrill-Ring Lumber Co. of Seattle. This is a 60-ft. boat with a beam of 10 ft. 6 in. She is to have a 65-H. P. Union engine and is probably the finest vessel of her kind ever built on Puget Sound. She will be used in connection with the company's mill in the north.

SHIP YARD NOTES.

The contract which the Northwestern Marine Co. of Seattle, Wash., made recently with Pienich & Martinovich, of Dockton, for the construction of a new fishing schooner, is reported to have been canceled. It is stated



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OUR MERCHANT MARINE.

On Saturday last the annual convention of the Merchant Marine League of the United States was held in Cleveland. There will be found elsewhere in this issue a brief report of that convention. A few pertinent observations might here be made concerning the meeting. Frankly this meeting did more to awaken public conscience upon the question of our merchant marine than any single event that has transpired so far. The evidence of this is already apparent. Men who had not hitherto given much thought to the matter are now discussing it with great intelligence. They all admit that something should be done. That is precisely what the Mer-

chant Marine League was organized for—to urge that something be done. It is rather unfortunate that the word subsidy should be connected with this movement because commonly the word has a discredited meaning. As Mr. Lewis Nixon said, it is odd that that which is regarded as a national affair in Great Britain should be considered a private affair in the United States. In whatever way it may be viewed, compensation in some form must be made. Any compensation is a subsidy, and it is odd therefore that opposition to the word should be so widespread. The tariff is a subsidy, and what would this country be without it?

It is quite clear that the campaign of education projected by the Merchant Marine League has borne fruit. There is no doubt whatever but that the question of the rehabilitation of the merchant marine of the United States is the most important question before the people today. Such a statement if made years ago would have excited ridicule; today, however, it is being taken seriously by men in all classes of life. As an eminent advocate has said, there are two kinds of persons in the United States, those that are heartily in favor of the upbuilding of the merchant marine and those that know nothing at all about the subject. That statement is literally true. If a person knows anything at all about the subject he must be in favor of upbuilding because no country was ever in a more helpless, lamentable and melancholy situation than the United States today. Think of sending a squadron of battleships from the Atlantic to the Pacific with foreign colliers! Why, this fleet could not leave New York harbor without the consent of Great Britain. What a ridiculous situation that is for the most resourceful nation in the world. We have a lopsided navy. No navy is complete without a complement of merchant ships. As Assistant Secretary Newberry, of the navy department, said, the warship is a complex and dependent instrument and cannot take the sea for many days together without replenishment of its supplies and these supplies can be drawn from no

other source than supply ships and colliers. The only economical auxiliary fleet is a merchant marine. The navy department could only maintain supply ships and colliers at enormous expense. They would have to build them and maintain them through many years of peace for possible use through a few months of war. Such a policy would cost the government hundreds of millions of dollars, and yet without this auxiliary fleet the American navy is utterly useless.

It is perfectly plain that this question of the merchant marine is one of common defense. How can there be a divided opinion upon the necessity of upbuilding it? That nation is most secure from insult which is most prepared to resent it; and yet he who opposes the upbuilding of the merchant marine is laying this country open to ignominious treatment from other nations. The United States could not possibly prevent the Japanese government from seizing and holding Hawaii and the Philippine Islands. Hundreds of thousands are probably willing that the country should get rid of the Philippine Islands, but is there an American living who would not resent their being taken by force? An adequate merchant marine is necessary to the preservation of national honor. The most direct and cheapest way to get it is to make the operation of steamships a profitable matter. It is unprofitable now owing to the artificial handicaps that our fiscal policy has imposed upon ship building and ship owning. These artificial handicaps should be surmounted by artificial means. If the American ship builder is permitted to standardize in the construction of ships he will speedily triumph over the obstacle of cost and build a ship quite as cheaply as a British competitor. The United States is already selling locomotives to the world because it is enabled to economize by standardizing the parts. What with our abundant natural resources and the high efficiency of labor-saving machinery, we may be able to build ships for foreign countries if given adequate assistance now.

AVERAGE LAKE FREIGHTS.

There is appended herewith the usual annual summary of lake freights for the season of 1907. It will be seen that the freight rate is practically without variety, maintaining a relatively uniform rate throughout the season. For the past three years the contract ore rate has been 75 cents from the head of the lakes, 70 cents from Marquette and 60 cents from Escanaba. During the present year the wild rate did not exceed these figures. Coal rates were established at 30 cents to Duluth and 40 cents to Chicago. Advances were paid on these figures in special instances late in the season but not sufficient to make a market until the closing days of navigation. The season opened April 25 and closed Dec. 5. Following is the summary:

1905 ...	46½	41½	33½	42	41½
1906 ...	46	42	35	42	42
1907 ...	40	35	30	35	35
Average for 10 yrs.	46½	38	38½	45	44

Chicago rate about same as Milwaukee.
Coal of all kinds shipped in net tons and handled without charge to vessel.

AVERAGE FREIGHT RATE ON IRON ORE PER GROSS TON FROM PORTS NAMED TO OHIO PORTS—
TABLE COVERING WILD AND CONTRACT RATES FOR TWENTY YEARS PAST.

	Escanaba.	Marquette.	Lake Superior.
	Wild or daily rate.	Wild or daily rate.	Wild or daily rate.
1888...	\$1.05	\$.90	\$1.30
1889...	1.01	1.00	1.19
1890...	0.89	1.10	1.07
1891...	0.84	0.65	1.02
1892...	0.74	1.00	0.98
1893...	0.56	0.85	0.71
1894...	0.46	0.60	0.60
1895...	0.73	0.55	0.92
1896...	0.52	0.70	0.66
1897...	0.45	0.45	0.55
1898...	0.51	0.45	0.60

1866....	12.34	1882....	2.50	1898....	1.53
1867....	6.67	1883....	3.41	1899....	2.71
1868....	7.14	1884....	2.18	1900....	1.79
1869....	6.81	1885....	2.02	1901....	1.42
1870....	5.88	1886....	3.68	1902....	1.51
1871....	7.62	1887....	4.13	1903....	1.41
1872....	11.46	1888....	2.56	1904....	1.32
1873....	7.62	1889....	2.51	1905....	1.67
1874....	4.03	1890....	1.96	1906....	1.72
1875....	3.42	1891....	2.38	1907....	1.57

Average for 48 years, 4.36.
Charges to vessels for shoveling, trimming and tallying weights of grain amounted to \$4.12½ per 1,000 bu. in 1907.

AVERAGE LUMBER RATES, DULUTH TO LAKE ERIE PORTS.

Year	Rate per M.	Year	Rate per M.
1907.....	\$2.58	1902.....	\$2.54
1906.....	2.71	1901.....	2.66
1905.....	2.45	1900.....	2.33
1904.....	2.54	1899.....	3.08
1903.....	2.57	1898.....	1.78

A REMARKABLE SEAFARING FAMILY.

A history, if written, of the Dupuic family of Marine City, Mich., would read like one of Clark Russell's romances of the sea. Six sons and every one of them a satellite of Old Father Neptune is a part of the family record. George, the eldest, is master of the steamer C. C. Hand, of the Gilchrist fleet; Joseph, is mate of the steamer Hanna; John, mate of the steamer Coralina for the past seven or eight seasons; Fred A., master of the steel steamer Neptune, also of the Gilchrist fleet; Herbert, mate of the steamer Butler for the past nine seasons, and Charles is mate of the steamer Corsica. All are young men and of sterling worth and character. The most remarkable thing of all, from the standpoint of a sailor, is that none of the boys use tobacco or intoxicating liquors. It is doubtful if there is another family of the kind on the lakes; if there is, the MARINE REVIEW would be much interested to know it.

EAST VERSUS WEST.

That the states on the Atlantic coast are planning to oppose the Lakes-to-the-Gulf deep waterway has become apparent through the formation, recently, of a committee of seven to try to combine into a single organization all the commercial bodies of the Atlantic coast region for the purpose of bringing about concerted action on behalf of the various inland waterways projects between Cape Cod and Beaufort, N. C. It is proposed that a three days' convention be held in Philadelphia in November, to decide upon a plan for the campaign for adequate appropriations for the contemplated waterway, included in which are the Cape Cod canal, a deeper channel at New York, the enlargement of the Raritan canal, the Delaware and Chesapeake canal, the Delaware channels and Philadelphia's desire for a 35-ft. channel in the Schuylkill river.

AVERAGE DAILY RATES OF FREIGHT ON THE GREAT LAKES.

	1906.	1905.	1907.
	cents.	cents.	cents.
Iron ore, Escanaba to Ohio ports, gross ton.....	60.00	60.75	60.00
Iron ore, head of Lake Superior to Ohio ports, gross ton.....	75.55	76.875	75.00
Iron ore, Marquette to Ohio ports, gross ton.....	70.00	70.00	70.00
Wheat, Chicago to Buffalo, bushel.....	1.7223	1.6719	1.5796
Wheat, Duluth to Buffalo, bushel.....	2.1959	2.315	1.8639
Soft coal, Ohio ports to Milwaukee, net ton.....	46.05	46.525	40.00
Soft coal, Ohio ports to Duluth, net ton.....	34.85	33.5	30.00
Soft coal, Ohio ports to Portage, net ton.....	41.97	35.3	50.00
Soft coal, Ohio ports to Manitowoc, net ton.....	41.97	41.525	35.00
Soft coal, Ohio ports to Sheboygan, net ton.....	41.97	41.525	35.00
Soft coal, Ohio ports to Green Bay, net ton.....	41.97	42.425	35.00
Soft coal, Ohio ports to Escanaba, net ton.....	41.97	41.525	35.00
Hard coal, Buffalo to Milwaukee, net ton.....	45.38	44.575	41.062
Hard coal, Buffalo to Chicago, net ton.....	46.20	44.575	40.777
Hard coal, Buffalo to Duluth, net ton.....	35.19	33.05	31.256
Lumber, head of the lakes to Ohio ports.....	271.00	245.375	258.549

AVERAGE DAILY FREIGHT RATES, TEN YEARS ENDING WITH 1907.

	CENTS.
Iron ore, head of Lake Superior to Ohio ports, gross ton.....	82
Iron ore, Marquette to Ohio ports, gross ton.....	73
Iron ore, Escanaba to Ohio ports, gross ton.....	63
Soft coal, Ohio ports to Milwaukee, net ton.....	46½
Soft coal, Ohio ports to Duluth, net ton.....	38½
Hard coal, Buffalo to Chicago, net ton.....	46
Hard coal, Buffalo to Duluth, net ton.....	35
Wheat, Chicago to Buffalo, bushel.....	1.66
Wheat, Duluth to Buffalo, bushel.....	2.13
Lumber, head of the lakes to Ohio ports.....	2.52

AVERAGE OF DAILY LAKE FREIGHT RATES ON HARD COAL FROM BUFFALO TO CHICAGO, MILWAUKEE AND DULUTH DURING TEN YEARS PAST.

YEAR—	CHICAGO.	DULUTH.
	CENTS.	CENTS.
1898.....	28	23
1899.....	73	49½
1900.....	48	39½
1901.....	50	38
1902.....	42	33
1903.....	48	38
1904.....	43	34
1905.....	44	34
1906.....	46	35
1907.....	40	31

Average for ten years..... 46 35
Rate to Milwaukee practically the same as to Chicago.
Hard coal is net tons and is handled without charge to vessel.

AVERAGE OF DAILY RATES ON SOFT COAL FROM OHIO PORTS TO MILWAUKEE, ESCANABA, DULUTH, GREEN BAY AND MANITOWOC.

Year.	Milwaukee.	Escanaba.	Duluth.	Green Bay.	Manitowoc.
	Cents.	Cents.	Cents.	Cents.	Cents.
1898 ...	28	26½	23	28½	28½
1899 ...	69	58	45½	66½	67
1900 ...	45	40	40	45	43½
1901 ...	49	46	38	48½	48
1902 ...	46½	41½	34½	46½	42
1903 ...	50½	45	41½	50½	46
1904 ...	47	40	37	45½	47

1899...	0.95	0.50	1.08	0.60	1.29½	0.60
1900...	0.69½	1.00	0.78½	1.10	0.84½	1.25
1901...	0.64	0.60	0.79	0.70	0.89	0.80
1902...	0.59	0.60	0.66	0.70	0.77	0.75
1903...	0.61	0.65	0.72	0.75	0.81	0.85
1904...	0.53½	0.55	0.62	0.60	0.70	0.70
1905...	0.61	0.60	0.70	0.70	0.77	0.75
1906...	0.60	0.60	0.70	0.70	0.7555	0.75
1907...	0.60	0.60	0.70	0.70	0.75	0.75

Charge to vessels in 1907 for unloading iron ore was 20 cents per ton. The wooden vessels that required trimming paid an additional charge of about 3 cents per ton for that service.

Average ore rates for the entire period of twenty years: Escanaba, contract 70½ cents, wild 68 cents; Marquette, contract 84 cents, wild 82½ cents; Ashland and other ports at the head of Lake Superior, contract 91 cents, wild 92 cents.

Average for past ten years: Escanaba, contract 61 cents, wild 63 cents; Marquette, contract 17 cents, wild 73 cents; Ashland and other ports at the head of Lake Superior, contract 78 cents, wild 82 cents.

LAKE FREIGHT RATES ON WHEAT, DULUTH TO BUFFALO.

Year.	Rate cts.	Year.	Rate cts.
1907.....	1.86		
1906.....	2.19		
1905.....	2.31	1894	1½ @ 3
1904.....	1.81	1893	1½ @ 3½
1903.....	1.6	1892	2½ @ 4
1902.....	1.9	1891	1½ @ 9½
1901.....	2.3	1890	2 @ 5
1900.....	2.0	1889	2 @ 5
1899.....	3.6	1888	2 @ 5
1898.....	1.75	1887	2 @ 8
1897.....	2.12	1886	3¼ @ 8
1896.....	3.50		
1895.....	3.50		

Figures for 10 years past average of daily rates for full season; previous to 1895 rates given are highest and lowest of the year.

AVERAGE RATES ON WHEAT PER BUSHEL BY LAKE FROM CHICAGO TO BUFFALO.

Year.	Cents.	Year.	Cents.	Year.	Cents.
1860....	9.89	1876....	2.90	1892....	2.38
1861....	11.53	1877....	3.72	1893....	1.66
1862....	10.49	1878....	3.07	1894....	1.27
1863....	7.51	1879....	4.74	1895....	1.97
1864....	9.58	1880....	5.76	1896....	1.70
1865....	9.78	1881....	3.44	1897....	1.56

SECRETARY STRAUS ON OUR MERCHANT MARINE.

Secretary Straus, of the Department of Commerce and Labor, makes some pertinent observations in his annual report concerning the condition of our merchant marine as follows:

"On June 30, 1907, the total documented merchant shipping of the United States comprised 24,911 vessels, of 6,938,794 gross tons, the largest tonnage in our history. In volume, merchant shipping under the American flag is surpassed only by merchant shipping under the British flag. In its types and uses, however, our shipping differs radically from the shipping of other maritime nations. It is almost wholly devoted to domestic transportation, and relatively is far below our strength as a naval power. Over one-third of our tonnage is operated on the great lakes, where it is cut off from the effective foreign competition, while the trade of our many rivers and canal systems employs another considerable portion, mainly of light draught vessels.

"By comparison with our rank in any other of the great divisions of industrial and commercial endeavor, the position of the United States as an ocean carrying power is insignificant. It is humble by comparison with the commercial sea power of other leading nations, with which in nearly every other respect we are classed. Even in the discharge of ordinary functions of government we have put ourselves under the protection of foreign flags. Not many months ago it became necessary to dispatch a small force of American troops to Cuba; they were sent under the British flag. More recently it was decided to transfer a powerful fleet of warships from the Atlantic to the Pacific, and the coal for this fleet is under the shelter of foreign flags, a situation which could not be afforded in actual warfare. Our mails to the republics of South America are carried almost entirely in foreign steamers, and to Australia and New Zealand they are now entirely so carried. I have alluded to the fact that in the performance of its plain duties the federal government had to resort to the foreign agencies and foreign protection. There is not today another first class power in a similar position. There is not another, I believe, which if it found itself in that position would allow such conditions to continue longer than until by sufficient expenditure they could be corrected in the shortest possible time. Such expenditures would be as clearly for public purposes as appropriations for the army, the navy, the Panama canal, or the postal system.

"From the messages of their presidents and the reports of their heads of

departments for many years past the American people have become familiar with the trilling share of American vessels in our own foreign carrying trade and with the fact that an American steamship is almost never seen in the world's seaports outside the Caribbean and the Gulf of Mexico. Last year, for example, only 10.6 per cent of our combined exports and imports were carried in American ships; our vessels registered for foreign trade aggregated only 871,146 gross tons, a fleet equaled in tonnage and greatly exceeded in efficiency by the fleet of one great foreign shipping corporation, while any one of several foreign corporations owns more ocean-going foreign steam tonnage than the entire amount of such tonnage registered under the American flag.

"The situation is not satisfactory, and for some years past it has been the subject of discussion, which unfortunately has not ended in action. For many years it was entirely in its internal development that there was no surplus to devote to expansion of national trade and influence outside our coast lines. It is equally true that such is no longer the fact. The acquisition of insular territory, the construction of a powerful navy, and the investment of American capital abroad are all tokens of a tendency in national growth which will compel our country to become again a sea power, as it was when the republic was only a fringe of states along the Atlantic seaboard.

"Our laws relating to the merchant marine differ in two important respects from the laws of other nations. Practically without exception the laws of other nations permit their subjects or citizens to buy ships in any market, put them under the national ensign, and employ them at least in the foreign trade. Our law restricts American registry and the American flag to vessels built in the United States. That this law is now useless as a measure of protection to American ship builders, so far as vessels for the foreign trade are concerned, it is amply demonstrated by the fact that for years we have built practically no such vessels under that law. Millions of American capital have been invested in steamships under foreign flags engaged in trade with the United States.

"Every maritime nation of consequence gives direct support in some form from the national treasury to merchant shipping. Even Norway has just voted a subsidy for a Norwegian line to Mexico, and Great Britain has advanced \$13,000,000 from her treasury to one corporation in order to reassert British primacy on the North Atlantic. They form an amount of support varying among nations, and from time to time with the

same nation, but the principle is as fixed as is the principle by which navies are maintained. The United States adopted the principle in the ocean mail act of 1891. Where federal support was adequate that act has been successful, and where its sagacious advocates declared at the time the support to be inadequate the act has failed. Three years ago, on recommendation of the president, a special commission of congress made an exhaustive examination of the whole subject of the upbuilding of the merchant marine. I do not believe that any further investigation is needed. That commission decided on a project of support from the federal treasury, based in its essentials on the methods of other maritime nations. The bill was approved by a majority of both branches of congress, and had the cordial support of the president and of every department connected with shipping. It failed to become a law through reasons too recent to need review. The bill was in substance an extension of the ocean mail act of 1891. Its aim was to provide fleets of superior mail steamships available for public purposes. The expenditures proposed were moderate by any reasonable standard of comparison which may be selected, and they were guarded by more than the average legislative restrictions on appropriations.

"I am prepared at this time to recommend a measure that shall insure us superior mail communications with the republics of South America, with Australia by way of our insular territories in the mid-Pacific, and with the Philippines by way of Japan and China. These special political and commercial reasons for the establishment of such lines of American steamships are so familiar to congress that a statement of them here would be superfluous. Such a measure involves no new principles and no departure from a system already justified by our own experience and that of other nations. The compensation provided by the ocean mail act of 1891 is inadequate to establish American steamship lines to the great republics of South America and to the Philippines, Australia and Asia. An amendment to that act increasing the compensation for such services to a rate which would be effective is at the present time the most feasible means of promoting our merchant marine. In my judgment the rate of \$4 a statute mile outward bound now provided for 20-knot steamers should also be provided for steamships of 16 knots or over on the routes which I have indicated.

"The need of better transportation facilities for passengers between Hawaii and the Pacific coast was impressed upon me during a recent inspection trip to the

territory. In consequence of the failure to provide sufficient mail pay at the last session of congress, our mail line to Australia by way of Honolulu and the Samoan group has recently been abandoned. This abandonment is a serious blow to our political and commercial prestige on the Pacific, but the loss is felt especially by the people of Hawaii. The three steamers of this line made 17 or 18 voyages annually between Honolulu and San Francisco and vice versa, and of this regular and comfortable means of travel the people of Honolulu and the islands are now deprived. The importance of knitting to ourselves as closely as possible our insular territory in the Pacific does not need argument. The sentiment in Hawaii in favor of suspending the law which restricts passenger trade between the territory and the mainland to American vessels is indisputably general and strong. The suspension desired will not be necessary if congress be willing at the coming session to pass a bill for improved mail communications with South America, Australia and Asia, as already suggested."

ANNUAL REPORT LIFE SAVING SERVICE.

S. I. Kimball, general superintendent of the life saving service, has completed the report of his bureau for the last fiscal year. During the period covered there were 278 life saving stations in operation, namely, 200 on the Atlantic and Gulf coasts, 60 on the Great Lake, 1 at the falls of the Ohio (Louisville, Ky.), and 17 on the Pacific coast (including 1 station at Nome, Alaska).

In the 12 months covered by the report the number of disasters to vessels occurring within the field of operations of the service was 838, involving 347 documented vessels, and 491 undocumented craft. Fifty-five of the endangered vessels were totally lost. The value of property imperiled—\$8,832,585—is, however, much smaller than that given in the tables for 1905-6, namely, \$15,041,140. The value of the property saved was \$7,432,985, the property loss being \$1,399,600 as against a loss shown last year amounting to \$2,775,040. Aboard the vessels meeting disaster there were 5,112 persons, of whom 45 were lost. Eight hundred and seven persons were succored at the stations, 1,140 days' relief being furnished.

The foregoing figures relate to both documented and undocumented vessels, the latter class including sailboats, small launches, row boats, etc. In the accidents to these small-

er craft, 1,176 persons were imperiled, 23 of whom were lost. The estimated value of the property involved was \$530,320, of which \$516,585 was saved.

There were 611 vessels, valued with their cargoes at \$5,661,235, saved under circumstances that would have resulted in serious damage or total loss but for the assistance of the life savers. In 449 of these instances, in which the property imperiled was valued at \$1,270,995, the station crew saved property to the value of \$1,238,935 without outside assistance. In the 162 instances remaining, in which the property endangered was worth \$4,390,240, they worked in conjunction with the crews of wrecking vessels, tugs, etc., saving property to the value of \$4,053,230. The station crews also afforded minor assistance to 714 vessels not included in the preceding figures, making a total of 1,325 to which aid was extended. The number of vessels warned from danger by the signals of the service patrolmen was 204; these warnings were given at night in 182 instances and 22 were given during the day in thick weather. Ninety-six of the vessels so warned were steamers.

The amount expended for the maintenance of the service during the year was \$1,790,198.97.

According to the report, the life saving crews are called upon to perform much service in the neighborhood of their stations which in no wise relates to their regular duties as salvors of life and property from shipwreck. For instance, during the year they rescued from the water 33 persons who had fallen from docks, vessels, etc., 22 bathers, 1 insane person, 2 would-be suicides, 3 persons endangered in the surf, and 2 who had broken through the ice. One person (a woman) was rescued from an attempted assault; one from a sewer; one from a breakwater; one, lost in a blizzard, and 107 from flood (at Louisville, Ky.). Ten persons who were ill or who had sustained more or less serious injury were treated and cared for by the life savers. Of these, one had broken a leg and four were suffering from gunshot wounds. Seventeen persons in urgent need of medical or surgical attention were conveyed to places where such attention could be secured. There were recovered from the water the bodies of 86 drowned persons, and the bodies of 13 persons who had come to their death from various causes were picked up on the beaches and elsewhere in the localities of the stations. The life

saving crews were also called upon to save considerable private property having no connection with shipping. They rendered effective service at 31 neighborhood fires; helped 3 automobiles out of serious difficulty; rescued several horse teams from dangerous situations; recovered 14 fish nets and, on one occasion 100,000 ft. of saw logs. In one instance they helped to take from a burning building 65 horses and 110 vehicles before the local fire brigade arrived on the scene.

Contracts were made during the year for the construction of a new life-saving station at Bethany Beach, Delaware, and at Garibaldi, Oregon, at the entrance of Tillamook Bay. The station at the first named place has been completed and put in commission, and that at the entrance of Tillamook Bay is approaching completion.

Title was secured to a site for a new station to be placed at Neah Bay, Washington, under act of congress approved April 19, 1906. This station is designed for service in conjunction with a first-class ocean-going tug (to be built and operated by the revenue cutter service) in saving life and property along the Washington coast. The necessity for such protection was forcibly emphasized by the terrible disaster to the steamer Valencia, which vessel, it will be remembered, was wrecked and sunk near Cape Beale, off the coast of British Columbia, Jan. 22, 1906, with appalling loss of life.

Three sites were selected during the year for stations at Isle of Shoals, New Hampshire; Green Hill (South Kingston), Rhode Island, and Cold Spring Inlet, New Jersey, respectively; and contract was let for building a station on Wood Island, Maine, in lieu of the old station at Jerry's Point, the station site at the last named place having been restored to the war department for military purposes.

To afford adequate protection to craft frequenting the new harbor at the south end of Jackson Park, Chicago, an advantageous site for a station building was secured at the harbor entrance. When completed this station will be manned by the life saving crew heretofore quartered at the station building erected in 1893 upon the grounds of the Columbian exposition, and which is no longer a favorable base from which to afford speedy relief to water craft in distress.

The Santa Rosa life saving station, situated on Santa Rosa Island near

Pensacola, Florida, was, on Sept. 27, 1906, demolished by a hurricane which also swept away all the life saving equipment of the station except a single boat, in which the station crew and their families fortunately made their escape. Within the year contract was awarded for replacing this station by a new structure, to be located not far from the site of the former one.

Within the year motive power was installed in several more of the large

self-righting and self-bailing lifeboats of the service, making the total number in operation at the end of the year 17. Numerous reports have been received from officers of the service in the field, and from keepers of stations, commending them as a most important addition to the life saving equipment. By their use 157 persons were landed during the year. The appropriation for the maintenance of the service last year was increased over that of the year before with the

view of adding to the number of these boats, and they are now being supplied as rapidly as possible to stations at which they can be advantageously used.

The general superintendent renews his appeal for the passage of a bill providing pensions and retirement for aged and disabled members of the service, and urges such legislation not only as an act of justice to the life saving crews but also as a matter of sound public policy.

MERCHANT MARINE LEAGUE

The annual convention of the Merchant Marine League of the United States at the Hollenden hotel, Cleveland, on Saturday last was one of the most important gatherings that has ever been in that city, and it undoubtedly gave new life and new impetus to the movement of the upbuilding of the American merchant marine in the foreign trade. Men were present from Maine to California and such unanimity of opinion as existed could bespeak nothing but an awakening conscience on the part of the whole people to the present situation. There was sufficient evidence, both tangible and intangible, that the movement for the upbuilding of the merchant marine is to gain such momentum as to sweep everything before it. As ex-Governor Myron T. Herrick, who acted as president of the day, said, it is the paramount question of our national life today. He thought that the majority of the people of Ohio endorsed the movement as the most important before the public. He pointed out that the United States had neglected sorely its great auxiliary naval fleet and that a great campaign of education, extending from Maine to California, should be promulgated to bring this fact pertinently home to the people. He felt that the United States was moving on toward the supreme control of the commerce of the world and that coincident with this conquest must come a merchant marine.

John H. Treadway, president of the Board of Commerce, felt that movement for the upbuilding of merchant marine was non-partisan sectional. He regarded it as that the American people have permitted its decadence, through ships alone that the brio of the country's commerce was woven.

A striking address was made by Truman H. Newberry, assistant secretary of the navy. He showed that all of the early naval vessels of the American navy were converted merchant ships and that the most signal victories won in naval history were won by these vessels. At that time the country was in possession of a naval force that could man the navy eight times over—40,000 American sailors. Never before and never since has a superior fighting force sailed the ocean. The victories of the American navy in the early days of the republic were due entirely to the fact that a large, vigorous and loyal merchant marine was behind it. He felt that a naval reserve was as necessary now as then, more so in fact, as the modern warship is a complex and dependent instrument. The early fighting ship needed no attendants. It was self-contained and was capable of taking to sea for years at a time without replenishment except for fresh water. It is not so with the modern ship. It must be supplemented with supply ships and colliers which can be maintained by the navy in times of peace only at enormous cost. There are years of peace to every day of war. He felt that the present trip of the Atlantic squadron to the Pacific coast had given sharp and unwelcome proof of our deficiencies. He regarded it as both perilous and mortifying that of the 30 colliers accompanying the fleet 29 of them should be foreign ships.

Congressman William S. Greene, of Massachusetts, who is the new chairman of the committee on merchant marine and fisheries of the House of Representatives, promised that he would do all that he could to forward the passage of a relief measure through the house. He felt, however, that congress could accomplish little

until a campaign of education had been waged through the newspapers. He was inclined to blame a great many newspaper editors for opposing the movement without taking the trouble to acquaint themselves with its merits. He added that he had solidified his own district to him by his advocacy of the shipping bill in the face of opposition of the newspapers of his own town. He frankly admitted that his visit to Cleveland had given him new faith, new hope and new courage.

Harry Coulby, of Cleveland, president of the Pittsburg Steamship Co., said that he had studied the question of the merchant marine a great deal. Freight moves along the line of least resistance. There is no patriotism in the dollar. In commerce people look for profit primarily. He felt that the American people would have to provide transportation for its products and pointed to the illustrious example of Great Britain which has by unceasing devotion to shipping woven the web of her commerce across the whole world.

Lewis Nixon stated that he was present both as an American citizen and as the representative of the board of trade of New York. The board of trade had just adopted resolutions demanding that the American navy be supplemented with coaling ships. Regarding the future of ship building in the United States he felt that the American ship builder could surmount the handicap of cost. The lake ship builders have already done so and are turning out splendid ships at a price that cannot be met anywhere else in the world. In the construction of locomotives the United States

has risen nobly above cost and sells to the entire world. The present obstacle to the American ship builder is the lack of opportunity to standardize, and he related that once when he was connected with a Philadelphia ship yard they were building on adjoining berths a ferryboat, a yacht, a revenue cutter, a tug and a battleship, a combination which would defeat the economy of Almighty God himself. England's supremacy in ship building was due to her ability to specialize. When the woods grew down to the water's edge the American ship builder was building the cheapest and finest ship in the world, but did England buy them? No; she would not permit her citizens to do so. Ship building is the keystone of the arch of the British empire and she has never bought a foreign ship, nor owned a foreign ship except by conquest. England became a great ship building nation under a great many handicaps for she had to purchase her material wherever she could find it. When the iron ship was developed, however, she linked it with a compound engine and while after the civil war the United States was developing its interior, England began developing the world. She had completed the commercial conquest of the world, exacting tolls from every country and the largest toll of all from the United States. Transportation is not a mere transfer of goods; it is an export. Our annual payment is \$300,000,000—one-half the value of our wheat crop. Mr. Nixon said that he realized the necessity of party expediency but hoped that we would not have to stand forever on party politics in settling this question. He ascribed the financial panic in part to the constant drain upon our resources for paying for the over-sea carriage of our products to other nations. It has got to such a point that the country is simply providing cargoes for English ships to carry and working hard to get the money wherewith to pay them.

"Why should that which is national in England be regarded here as a private affair," he asked. This was his very pointed reference to the generous subsidies voted by Great Britain to her steamship lines without one word of protest from the British nation, whereas a similar effort in the United States is always regarded in the light of someone making a raid upon the treasury for private purposes.

Congressman W. E. Humphrey, of Seattle, said that when the law on merchant marine was written on the

state books of the United States more credit would be due to Cleveland than to all other cities combined. He made an address bristling with facts of the most convincing character. The Oceanic Line to Australia operating three ships have ceased running owing to lack of government support. The Pacific mail running to Hawaii and the Orient is seeking a purchaser. Of three lines running from Puget Sound to the Orient the Boston Tow Boat Co. has gone out of business. The steamers of the Boston Steamship Co. are to be sold, and the Great Northern Steamship Co. will not replace the Dakota which was wrecked off the coast of Japan a few months ago. Of the American merchant ships operating on the Pacific ocean only eight now remain. Meanwhile the Sailing Ship Owners' Association, an organization of foreign steamship companies, has already raised freight rates in some cases over 400 per cent. It was the subsidized ships of Japan which won the war with Russia. He stated that 7 cruisers, 19 battleships and 10 torpedo boats are on their way to the Pacific coast, and when they get there they will have just 8 merchant vessels to protect. He advocated a direct subsidy. He hoped that when the Panama canal was finished there would be American vessels afloat to use it and said that he would like to have the first vessel to use it named the Marcus A. Hanna with Theodore Roosevelt standing on her decks.

Welding Ring and W. B. Craigin, members of the New York Produce Exchange, were present and suggested that American citizens should be permitted to buy ships wherever they could get them cheapest. Senator Gallinger replied that he did not think a dollar could be raised in this country to buy a foreign ship and operate her under the American flag in over-sea trade. He added that all materials to be used in the construction of a ship for the foreign trade could be imported duty free and suggested that the American ship yards be given work in that manner if anyone was disposed to try the experiment.

At the afternoon session George J. Seabury, of New York, made the opening address, saying that for the first time in his life he felt as though he had gotten among friends of the American flag on the high seas. He stated that he had no interest whatever in the subject except as a student of economic topics. He made an interesting plea for the rebuilding of the American merchant marine.

J. G. Butler Jr., of Youngstown, related the visit of a delegation of 25 to Washington to present this subject to President Roosevelt and Speaker Cannon last year. The delegation endeavored to tell the president something about the question but it was only a minute before the president was telling them all about it. They found him to be earnestly in favor of the measure. The delegation then went to the capitol and had an audience with Speaker Cannon, Mr. Butler acting as spokesman. Cannon's reply, timed by a stop watch, took one hour and ten minutes, and Mr. Butler said that it reminded him of a lecture he once heard in Warren entitled "Sixty Minutes in Africa," the lecturer never once mentioning Africa. Speaker Cannon had little to say about the shipping bill but the delegation later discovered that he was really in favor of it, as, in fact, his subsequent actions proved.

"What we want," said Mr. Butler, "is a comprehensive bill, something that will do the business. Every country that amounts to a damn has subsidized its merchant marine and we should do the same."

Mr. Butler remarked sotto voce as he left the stand that the supreme court had latterly held that "damn" was not a profane expression.

Congressman Ernest M. Pollard, of Nebraska, made an earnest plea in behalf of the upbuilding of the merchant marine. He felt that it is of vital interest to the farmer as the country is on the verge of a great agricultural development and will soon need a vastly increased market abroad for the consumption of its products. He felt that 90 per cent of the people of Nebraska were in favor of a measure that would seek to relieve the present condition in which this country finds itself, owing to its lack of ships.

F. E. Case, president of the Harvard Co. of Canton, related that Edmund Burke once declared that it took the British parliament 40 years to do a thing after it had been proved to be necessary. He felt that our 40 years were up. His address was a contrast between conditions as they existed 50 years ago and as they are now.

Wm. Livingstone, president of the Lake Carriers' Association, also spoke briefly and then the principal speaker of the afternoon, Hon. T. J. McCleary, second assistant postmaster general of the United States, was introduced.

Mr. McCleary's views are clear and sound. He regards the merchant marine from the standpoint of national defense and showed clearly wherein the country is lacking. He is in exclusive charge of the transportation of mail and showed

(Continued on page 30.)

HEELING DEVIATION.

Editor Question and Answer Department, MARINE REVIEW:—I would like to have you explain the principal features of the changes in the deviation due to the heeling of a boat, and how to ascertain the amount for various degrees of heel and for all courses; what is the basis for computation? Is it true that the heeling deviation changes 2 degrees for every degree of heel? Can the heeling deviation be accurately adjusted and is it necessary to heel the boat in order to make the adjustment; can it be done without listing the ship by means of the dipping needle? Why is it that the heeling deviation is greatest on north and south and the needle is always drawn toward the high side of the boat? I understand that the local inspector questions candidates for licenses very thoroughly on this subject. Don't you think this rather unnecessary and too complicated for lake men to understand? I will thank you very much for your answer.

"ONE IN THE HARNESS."

Cleveland.

The magnetic field of a ship's magnetism and its action on the compass needle is altogether different between the positions of even beam and when listed. This is easily seen, but to make it all the more so, imagine a horizontal plane passing through the compass with the ship on an even beam. Imagine this horizontal plane to be the magnetic field of the ship's magnetism. When the ship is on an even beam this horizontal magnetic field is parallel with the horizontal face of the ship's compass, and if the ship were on an even keel at the same time, this field would also be parallel with the ship's deck, or the whole of the ship's deck might be taken to represent the ship's field of magnetism. Now, when the ship heels this horizontal plane or magnetic field, heels with it, but the compass retains its balance owing to its gimbal action; hence, the same magnetism that acted on the compass in the first position does not act now, and the force might be either a stronger or a weaker one.

As the ship heels over the earth's inductive force changes the magnetism in all iron that can only hold its magnetism temporarily, as soft iron, for instance, and all vertical iron, whether it has permanent or temporary magnetism, changes its field of operation in respect to the compass needle, so that the effects due to heel are not only a combination of causes, but a complication of causes as well, and the force that acted horizontally in the one case has now changed toward a vertical force and the vertical toward a horizontal.

When a ship is on an even beam the various forces that produce deviation are considered as being horizontal, notwithstanding that there is a vertical force acting at the same time, and because this vertical force is a downward pull on one or the other of the poles of the compass needle, it is neglected, but when the ship heels this vertical force comes out on either one side or the other of the compass and produces a disturbing force and consequent change of deviation of the compass.

Since the heeling deviation is always the greatest with the ship's head north or south correct magnetic, and nothing with ship's head east and west correct magnetic, the first thing to determine then is what is known as the heeling co-efficient. This is the deviation on north or south, caused by 1 degree of heel, and is found by dividing the difference between the deviation with the ship on an even beam and ship heeling, by the number of degrees of heel. Example: Dev. on N, ship on an even beam, 0°, when heeling 8° to starboard, Dev. is 12° Wly.; therefore, 12 divided by 8 gives 1.5° Wly., as the heeling co-efficient, for each degree of heel to starboard. From this it will be seen that the heeling error is directly proportional to the amount of the heel.

Now, when the heeling deviation is required to be known for any other course besides north and south, it can easily be found by knowing the co-efficient on N or S.

To get the heeling deviation for any other course and heel and knowing the heeling co-efficient: Rule—Multiply the number of degrees of heel by the heeling co-efficient. Enter the traverse tables under the angle equal to the course of ship's head correct magnetic; seek in the distance column for the product found in multiplying the degrees of heel by the heeling co-efficient and opposite it in the column "Diff. Lat." will be found the heeling deviation on that course.

Steering NNE correct magnetic, heeling 14° to starboard, how much is the heeling deviation, the heeling co-efficient being as above, 1.5°? Explanation: $14 \times 1.5 = 21.0$; turn to NNE in tables and find 21 in Dist. column and opposite; in the Lat. column will be the amount of the heeling deviation for that direction and the heel of the boat, the answer is 19.4°.

Here is another and probably easier way of doing it: Take the parallel rulers and lay off a course of NNE and draw it to a pencil line. Take the dividers and measure off 19.4 from the mile scale and lay this off on the line drawn to represent the course of NNE; make a dot to represent the points of the divid-

ers. Next lay the parallel rulers over N and S on the chart compass and run this over to the pencil line so that it is directly over the lower of the two dots; draw this to a pencil line and draw it longer than it need be. Next lay the parallel ruler over E and W of the chart compass and transfer this line up to and directly over the upper dot and draw a pencil line that will reach from the second line (N and S) drawn to and through the first line (NNE) drawn. You have now constructed a right angle triangle, the same as given in the traverse tables. Measure the length of the N and S line drawn using the mile scale of the chart and each mile will be a degree, and that is all there is to it. The NNE line represents the hypotenuse of a right angle triangle and the N and S line the perpendicular. The length of this perpendicular will always be equal to the heeling deviation. Any chart may be used and the lines can be drawn at any place on the chart. Any scale can be used, the larger the scale the larger the triangle. It will be seen from this that the heeling deviation changes in the same proportion as the sides of a right angle triangle.

Now, to get the heeling co-efficient when the ship is heading other than N or S. Simply invert the above operation. Take the same example: Heading NNE, heeling 14°, Dev. between upright and heeled 19.4°. Draw a N and S line 19.4 units long; draw a NNE line to intersect with the beginning of the first line, then draw an E and W line to intersect with the end of the first line drawn. You have drawn the same triangle as before, measure the length of the NNE line, which will be 21 units long and divide this by the amount of your heel and you get the heeling co-efficient as before.

In some cases the heeling deviation amounts to as much as 2 degrees for every degree of heel. This is not a fixed rule and far from it.

The adjustment for heeling deviation is no more perfect than the adjustment made with the ship upright. In some cases it can be done accurately, but in most cases it can not. The conditions must be very favorable. The adjustment can be made without heeling the ship by use of the dipping needle, but this is not as satisfactory a way as listing the ship.

The heeling deviation is greatest on N and S for this reason: When the ship heels much of her magnetism changes; owing to the earth's inductive force, that is, the low side becomes magnetic through the earth's vertical force and the low side becomes an opposite pole to the earth's magnetism, which north of the equator is south in polarity. This makes a north pole of the low side of the ship and a south pole of the high side, and

the north end of the needle is drawn toward it; therefore, heading N with a starboard list, the heeling deviation is, as a usual thing, Wly. and Ely. with a port list. Heading south with a starboard list the heeling deviation is Ely. and Wly. with a port list.

Under ordinary conditions the north end of the needle draws to the high side, but not in all cases. The best and simplest way of handling the heeling deviation is to list the boat. This is easily done with boats having water bottoms. List the ship, say 10 degrees, and find the heeling deviation for each point between N and E. List the ship both ways. From this figure out the heeling coefficient and see if the theory tallies with the practice. Heeling deviation is a perplexing problem so that the best and surest way is to find it in practice. The heeling magnet should also be adjusted with the ship heeled both ways and the results compared with the ship swung on an even beam.

No, the heeling deviation is not a difficult thing to understand by any means, and any lake master is equal to a full understanding of it. The subject must be treated practically and not so much theoretically. This subject as it is usually explained becomes a difficult thing to understand by the ordinary person, but when it is boiled down to actual facts and as it comes up in practice there is not much about it that the average master cannot learn and very easily at that.

No, I do not agree with you, it is a very essential thing to know and understand and the local inspector is to be commended for his good judgment. The only pity is that there are not more of them asking such questions. You must bear in mind that anything that tends to increase a man's knowledge of his work and to elevate the standard of his profession is a step in the right direction. The government should be first of all in such matters. When an inspector requires these things in his examination the candidate sits up and pays attention, whereas, on the other hand, he would take no notice of such matters, thinking that they were unnecessary because they were not asked. It is simply wonderful how much some men can learn when they are forced to it. The local inspector has done a wonderful good work for the lake marine in bringing the examination work up to its present high standard. We are living in an age of progress and to keep up with the pace set we too must progress correspondingly. The lake ship has had a phenomenal growth in the past few years which has increased the difficulties and problems of her navigation to such an extent that many have been taken unawares, and are unable to cope with them without as-

sistance and the study of books on the subject. If you are right minded and can see any distance ahead you must acknowledge that this is the right and only course to pursue.

QUESTIONS FOR MASTERS AND MATES.—NO. 53.

701. Does the earth rotate on its axis at a uniform rate of speed?
702. Does the earth revolve round the sun at a uniform speed?
703. Is apparent time regular or irregular, that is, does the sun come to the meridian every day at the same time?
704. Why is the sun's time irregular?
705. The sun is on the meridian every day at 12 o'clock, what kind of time?
706. What is mean time based upon?
707. Is the sun on the meridian every day at 12 o'clock mean time?
708. Why?
709. How does the sun bear at 12 o'clock apparent time?
710. How could you set your watch to mean time by knowing the sun's true bearing at true noon?
711. What is the difference between true or apparent time and mean or average time?
712. Is the time from noon to noon each day the same by the actual time?
713. Why?
714. Since the earth rotates on its axis at the same rate of speed, what is the actual time of rotation according to mean time?
715. Why is the sun's time used instead of star or sidereal time?

QUESTIONS FOR WHEELSMEN AND WATCHMEN.

319. What is the difference between a common fraction and a decimal fraction?
320. What advantage is there in using decimals instead of common fractions?
321. Write a decimal fraction.
322. Write a common fraction.
323. Name some of the denominators of a decimal fraction.
324. Write in figures five-tenths.
325. Three-hundredths.
326. Seven-thousandths.
327. Write two-fifths as a common fraction.
328. Write seven-eighths as a common fraction.
329. Express one-quarter as a decimal.
330. How do you know that three-quarter is 0.75?
331. What is the rule for changing a common fraction to its equivalent decimal?
332. What is the rule for turning a decimal fraction into a common fraction?

333. What is the principle of the decimal fraction based upon?

ANSWERS TO QUESTIONS FOR WHEELSMEN AND WATCHMEN.

285. Get a copy of the government Rules of the Road, either from a local inspector or from the United States Steamboat Inspection Service, Washington, D. C. Also the government lighthouse books, either from a customs officer or from the Lighthouse Board, Washington, D. C. Also government charts covering the waters for which I wish to be examined on.

286. The Rules of the Road and the laws upon which they are based; light-houses, fog signals, courses and distances, shoals and how buoyed, etc.

287. Being able to distinguish one color from another. This is done by various colored yarns put in bunches promiscuously, the candidate being required to match all those of the same color. There are other tests, but this is the principal one.

288. By having another person give me a test in distinguishing colors.

289. Four or more short and rapid blasts of the whistle.

299. Three years.

300. The influence on the compass due to the iron and steel of the boat, such as the vessel being built of iron or steel, the boilers, engines, and all other equipment made of iron or steel.

301. If there is no danger of collision, the steamer that has the other on her own starboard side may cross first provided the steamer to starboard deems it safe. If the steamer to starboard assents then she must keep out of the other one's way by putting her helm to starboard, or to stop and back if necessary. If the steamer to starboard does not assent to the other crossing first she must sound an alarm signal and if necessary both steamers must stop and back until signals for passing in safety are made, answered and understood.

302. This situation is similar to the one just described. If the steamer which is to give way to the other under ordinary circumstances has room enough to cross ahead of a steamer which has the right of way in close quarters, without risk of collision, may cross ahead of the other; steamer, after giving the necessary signals, and receiving an assent from the other steamer which has the right of way, in close quarters.

303. When she is under the control of her rudder.

304. The sideway drift of a vessel due to the pressure of the wind and sea.

305. By observing the wake astern; if this makes an angle with the keel,

line of the ship, the ship is making leeway. The angle made by the difference of the two is equal to the leeway.

306. Leeway to the right, allow it to the left; and to the left, allow it to the right.

MERCHANT MARINE LEAGUE.

(Continued from page 27.)

that the postage department is making a profit of 3½ million per annum on sea postage. He also showed how, if this money were directed towards the projection of other mail routes, it would speedily result in the creation of an adequate merchant marine as well as to greatly stimulate trade in quarters of the globe that now rarely see American products.

The banquet in the evening was a brilliant affair and was presided over by Harvey D. Goulder, president of the league. The speakers of the evening were: Senators J. H. Gallinger, of New Hampshire, and Joseph B. Foraker, of Ohio. Mr. Gallinger's address was a careful review of the present situation. Attention will be paid to it later in the columns of the REVIEW.

Senator Foraker made an especially forceful address and it was listened to with the utmost attention. He was, in a way, a new element but he proved himself to be a devoted friend of American shipping, admitting a preference for differential duties but willing to accept any reasonable means of restoring our prestige upon the seas. The few sentences in which he referred to the present industrial condition were greeted with rounds of applause, almost unanimous applause, one might say, from the business men present, especially the sentence that wrong doers should be punished without inviting wholesale commercial disaster.

THE RESOLUTIONS.

The resolutions, prepared by a committee of which J. H. Dempsey, of Cleveland, was chairman, were unanimously adopted, as follows:

Resolved, By the Merchant Marine League of the United States, in national convention in Cleveland, Ohio, Dec. 21, 1907, that new and striking events have powerfully emphasized the need of an American commercial fleet on both the Atlantic and the Pacific oceans.

During the past year one of the three American steamship lines crossing the Pacific has been abandoned, and four of the seven ships of another line have disappeared, seriously reducing our communication with Hawaii, cutting off Samoa and leaving us more than ever dependent upon foreign flags to reach our garrisons and naval stations in the Philippines.

Meanwhile, the postoffice department, in despair at the slow, careless and irregular service vouchsafed by the European ship trusts and "com-bines" monopolizing our communication with South America, has been forced to direct that the United States mails for the greatest of the southern republics be sent via Europe, thus following a triangular route and crossing the Atlantic twice to reach their destination.

FOREIGN BOATS USED.

And, finally, the navy department of the United States, searching for American steamers to carry supplies for our great battleship fleet on its voyage to the Pacific coast, has found that almost no ocean vessels are available, and has been compelled to charter for this national service a motley flotilla of British, Dutch, Norwegian and Italian tramps, that could not be lawfully used, or trusted, in actual war. Nor, unless congress acts, will conditions change and improve. With some of the largest and best ship yards in the world, our commercial ship building is practically dead; for the first year in our national history not so much as one ship designed for over-seas trade is now under construction in all America.

These humiliating facts—alike a menace and a disgrace to the American people—are the logical and inevitable fruits of half a century of national neglect of ocean ship building and navigation. Wise laws could have prevented the destruction of our ocean fleet, and wise laws can now restore it.

PRESIDENT'S WORDS APPROVED.

The Merchant Marine League of the United States, declaring that there is no more imperative duty before the present congress than the revival of our shipping and the relief of our seaborne trade, heartily applauds the earnest and patriotic words of President Roosevelt in his message to congress, that as "the first step" and "the step most feasible at the present time," toward a complete rehabilitation of our mercantile sea power, the ocean mail law of 1891 be so amended and liberalized that swift and regular postal lines of American-built steamships designed for auxiliary use in war and working under contract with the postoffice department, may be promptly established to the chief markets of South America and across the Pacific to Japan, China and the Philippines.

This would mark a long advance toward a complete breaking of the insolent and dangerous monopoly of

nine-tenths of our ocean-carrying trade now exercised by foreign steamship corporations, whose ships and men, bound by bounties and conscription, form the naval reserves of foreign governments, our rivals in trade and possible enemies in war. By the strange irony of fate, we Americans, lacking an auxiliary navy of our own, are now supporting the auxiliary navies of Europe and Asia through payment to foreign ships for carrying our mails, freight and passengers of a tribute of \$200,000,000 a year, a vital drain upon our national resources, and a constant menace to our monetary system.

DEFIANT MONOPOLY.

No monopoly is so defiant, so arrogant, or so perilous to the interests of the manufacturers and their employes, the merchants and especially the farmers of America, as this foreign steamship monopoly, with its power to repress our commerce and rob us even of the means of defending our flag. The Merchant Marine League of the United States calls upon every senator and representative in congress, irrespective of party and irrespective of section, to help to break the grip of foreign ship trusts and combinations, and to give the country American ships and American sailors, ready to carry our mails and our trade to distant markets and in case of need to reinforce our battle line.

The old officers of the league were re-elected as follows: Harvey D. Goulder, president; Col. J. J. Sullivan, treasurer, and John A. Penton, secretary.

Announcement was made of the prizes which the Merchant Marine League had offered to students of schools, colleges and universities throughout the United States for the best essay on the subject "How to Build Up Our Shipping in the Foreign Trade." The prizes were awarded by Judge R. W. Tayler, of the United States district court, as follows: First prize, Clifford S. Johnston, 535 Third avenue, Detroit, Mich.; second prize, W. P. Munger, 803 Hayes street, Nashville, Tenn.; third prize, J. G. Honnold, university of Minnesota, Minneapolis, Minn.; fourth prize, L. M. Erskine, Brunswick, Me.

Two liens have been filed against the turbine liners Yale and Harvard, of the Metropolitan Steamship Co.'s fleet, by Charles M. Englis, of Greenpoint, L. I., N. Y., for \$225,750 each. Englis is the builder of the steamships and the liens are to secure amounts alleged to be still due to him for the construction of the vessels. The steamers have been in commission only a few months.

ATLANTIC COAST GOSSIP

Office of the MARINE REVIEW,
Room 1005, No. 90 West St.,
New York City.

In a sudden squall which struck the North river on Monday, the pressure on the great unprotected bow of the Mauretania was too much for the shore lines, which parted, letting the big vessel swing across the dock. The stern lines held, however, and with the assistance of several tugs, which were hurriedly mustered, the Cunarder was returned to her berth. An ash barge which, with other small craft, was moored alongside the drifting vessel, was caught between the vessel and wharf and completely crumpled.

Owing to the fact that the housing built on the new Chelsea extension pier of the Cunard line is a low-lying temporary structure, the Lusitania and Mauretania tower high above its roof. At the time of the accident to the Mauretania, owing to its being high tide and very little freight aboard, the vessel was riding even higher than usual.

The new turbine steamship Creole, of the Southern Pacific Co., will have her final trial trip on Saturday between New York and New Orleans. The Creole is the first large vessel equipped with turbine engines to be built in this country, and has accommodation for 148 first class, 48 second class and 500 steerage passengers.

The most severe wind storm that Chatham, Mass., has experienced in many years swept along the shore about 3 o'clock, Monday, and after five minutes died down as suddenly as it arrived. No serious damage to local craft is reported.

The placing in commission of power lifeboats is strengthening considerably the efficiency of the life saving service along the coast. The undoubted superiority of this type of boat over the boat manned by oarsmen has been effectively proven within the last year, and the department has already authorized the establishment of several additional boats on the New England coast. A power boat is in commission at the station at Stage Fort, Gloucester harbor, and it is expected that two more will be added to the service at life saving stations on the Maine coast.

The tramp steamship Muriel Coverdale is on her way—in ballast—from Port Said, Egypt, to Portland, Me., to load grain for Great Britain. Shipping men consider it remarkable that a steamship should make a trip of about one-fourth the circumference of the earth without a

cargo, to get freight to carry a matter of about 3,000 miles.

The four-masted Boston schooner Augustus Welt has been towed into harbor at Cape Lookout on the North Carolina coast, by the Cape Lookout lightship, which picked her up at sea.

The schooner Augustus Welt was abandoned by the crew several days previous in a sinking condition, and was owned by Harrington, King & Co., of Boston. She was insured by a Boston firm of underwriters.

The torpedo experimental range in Noyac bay, off Sag harbor, may, in the near future, be transferred to St. Joseph's bay, on the Gulf coast of Florida, owing to the presence of ice during winter at the present situation. For more than 16 years these waters have been used as ranges for the Whitehead and Bliss-Leavitt torpedoes.

The Erie railroad's new double-decked ferryboat Jamestown went into service on the North river last Saturday. She is the fifth new boat added to the Erie ferry service within the last two years, and is considered the fastest of her size and type in New York harbor. Her general dimensions are: Length over all, 224 ft.; beam, 64 ft., and twin engines of 1,600 H. P. She has sitting accommodation for 1,100 passengers.

The Lloyd Sabaudo Italian Mail Line's agent at New York has received a cablegram from Glasgow announcing the launching of their new 14,000-ton twin-screw steamship Principe di Udine. The steamship, when completed, will have a speed of 18 knots, and is expected to run between Naples and New York in 10 days. She will have accommodation for 150 first class, 150 second class and 400 steerage passengers. She is expected to make her maiden trip to New York in June, 1908.

The White Star liner Baltic, which arrived at New York on Saturday, reported the first iceberg sighted this season by the trans-Atlantic passenger steamer. The berg was 200 ft. in length and 50 ft. high.

The annual banquet of the Maritime Association of the port of New York will be held at the Waldorf-Astoria on the evening of Feb. 8. The program this year includes addresses by Governor Hughes, Secretary of the Navy Victor H. Metcalf, Admiral Coghlan, Mayor McClellan, and Collector of Customs Edward S. Fowler.

THINGS WORTH CONSIDERING.

Wide-awake sailors today believe in the common-sense course of spending a portion of the dog-watch in self-improvement—getting to windward, as it were. The man who does not study these days remains at a standstill, and gradually drifts on a lee shore, a position from which he is unable to tack ship.

Many excellent under-officers, and many wheelmen and watchmen and able-seamen, would have been mates and masters of vessels long ago had they understood navigation.

This is an age of progress, and you must join the onward march of other professions. The progress of the age is closely identified with education. Education not only imparts efficiency, but also commands the respect of the subordinates and superiors alike, and is the surest way to advancement.

Navigation is a book study, and a man might just as well go to sea to learn to read and cipher as to expect to acquire a correct knowledge of navigation on the deck of a vessel. Do not confound navigation with seamanship. The place to learn seamanship is on board ship. The average practical lake man is a first-class seaman, but a poor navigator.

During the winter season when boats are laid up the art of navigation may be easily and quickly learned by the officers of same, who should consider it a duty they owe their employer to become familiar with the science, so far as it applies to their calling, and to reach the highest "rat-line" in their profession—thus promoting their own interests.

Accurate information from Buffalo gives the record cargo of the steamer Leland S. DeGraef, delivered at that port last week, as 421,961 bu. The steamer was billed for 422,000 bu., and therefore weighed out only 39 bu. short.

Considerable repair work will be done at the Buffalo ship yard during the present winter. One of the most seriously injured boats is the James Gayley.

The annual meeting of the Lake Carriers' Association has been postponed until Jan. 16.

Capt. Harry Gunderson, of the steamer Henry Steinbrenner, has retired from sailing to engage in business in Chicago.

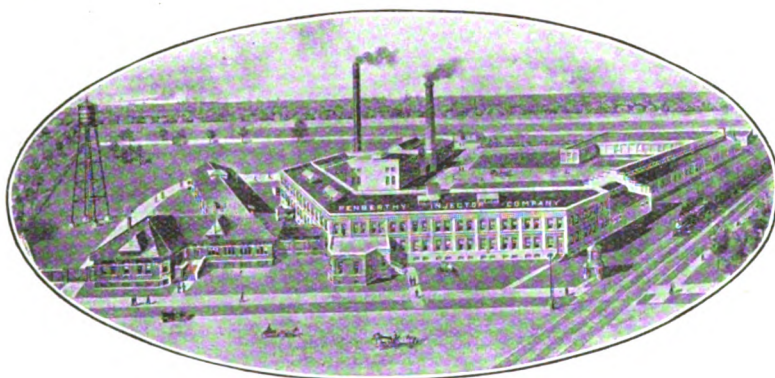
George A. Gallinger has been appointed manager of the Pittsburg office of the Independent Pneumatic Tool Co. with offices at 1210 Farmers' Bank building.

PENBERTHY INJECTOR CO.

The Penberthy Injector Co. was organized in 1886. The president of the company, S. Olin Johnson, was at that time the general manager of the Detroit Knitting & Corset Works, located at the corner of Seventh and Abbott streets, Detroit, Mich. The inventor of the original Penberthy injector was one William Penberthy, of Leadville, Colo., who, on his way east, stopped at the exposition at Chicago, held during that year, where he saw an exhibit of an automatic re-starting injector which so interested him that he devised what he thought to be an improvement. This injector was

This injector from its simplicity and reliability at once became a favorite with engineers generally and in the fall of 1901 business was at its best up to that time. In November of this year an explosion of the boilers belonging to this company occurred, completely destroying the original three-story building, together with all tools and machinery, but the main building withstood the shock.

Steps were immediately taken to continue the business temporarily in the main building while the new factory (as shown in cut, extending 250 ft. on Holden avenue) was being completed and moved into in the spring of 1903.



PLANT OF THE PENBERTHY INJECTOR CO.

brought to the attention of Mr. Johnson, a test was made which proved fairly satisfactory and a patent was applied for and granted. Mr. Johnson set aside in the building of the corset works a room about 20 x 30 and installed therein a tool lathe and two brass lathes and began the manufacture of the injector which was at the time of the organization of the company called "Penberthy."

It is a matter of history unknown to the general public, that the injector so called and invented by Mr. Penberthy was an absolute failure. There were 170 of these injectors made and within 60 days after they were sent out, they were recalled and melted up. In the meantime the company had improved on the original injector, manufacturing 4,000, which proved very satisfactory. Experiments developed another still better machine of which some 12,000 were made and sold.

At about this time the superintendent of the company, Thomas J. Sweeney, invented the injector that has since then been sold by the Penberthy Injector Co. throughout the world, no changes having been made after the first 16,000 were manufactured as above mentioned.

The business grew very rapidly and necessitated within two years the building of a three-story factory, 50 x 100 ft., adjoining the corset works. At the end of three years, the corset business was sold and the building occupied by it was turned into the offices, stock and assembling rooms of the injector company.

In 1886 they employed four men and now employ from 275 to 300, and are manufacturing more injectors than any other one, if not any two concerns, in the world. In May of this year they completed the manufacture of 500,000 Penberthy injectors which does not include 50,000 under the brand of "Auto-Positive" a somewhat different type of injector.

One may conceive of the popularity of this injector and the push and energy of its manager, S. Olin Johnson, when it is known that they have surpassed all competitors, including those who were in business years before they started. They claim that during the period of their business history no other concern has sold over 200,000 injectors.

The business of this company extends all over the world. There is no country of any importance on the globe to which Penberthy injectors have not been sent.

In addition to injectors, this company manufactures a large line of boiler and engine room appliances, such as lubricators, oil and grease cups, water gages, gage cocks, etc., all fully illustrated and described in a 70-page catalog which they publish.

The present officers of this company are: S. Olin Johnson, president and treasurer; his son, Homer S. Johnson, vice president and secretary.

Homer S. Johnson took an active interest in the business in the beginning of

1905 and since that time has been largely instrumental in the development and large increase in the business. He has taken a large amount of detail and work from the shoulders of his father and his aptitude for looking after details of the manufacturing department has resulted in greatly reduced cost of manufacture and a system whereby the business is run like clock work.

Until 1906 the president had entire management of the business and is proud to have built up during that time the largest injector manufacturing business either in the United States or any foreign country in the world.

The increase and success of any business is in a measure due to those men who sell goods on the road and to the general sales manager, George H. Andrews, credit is due for the many years he has brought the "Penberthy" injector before the large buyers by personal interviews. His fine personality, together with his ability as a salesman, has in no small way contributed to the general success of the business.

Another gentleman who should be mentioned in connection with this company is A. Sheldon Lee, who for seven years traveled exclusively in foreign countries. During that time he traveled twice around the world, visiting every country on the globe of any importance and through his energy built up a large foreign trade.

Within the last year the addition to the left as shown in the cut has been added to the main factory. This was erected as an office, stock and shipping room, the front of the building being used expressly for offices. The main office is in oak while the president and secretaries' rooms are in mahogany. The directors' room or den is in flemish oak, all offices being wainscoted to a height of 5 ft. The floors are all oak and altogether the building is one of the handsomest office buildings in the city. They are located at the intersection of Holden avenue and the Grand Trunk railway, the property covering three acres of which fully 1½ acres are occupied.

This company has a branch factory in Canada where they have been manufacturing for the past 18 years, during which time they have built up a large business, not only in injectors but in boiler room appliances as well. S. Olin Johnson and his son have general supervision over the business and hold the same offices as in the parent company. Seth J. North is general manager and has shown himself to be a careful, conservative business man and under his management the business is growing each year. The factory is located in Windsor, Canada, and being an independent Canadian corporation, is styled the Penberthy Injector Co., Ltd.

A GOOD WORK BADLY NEEDED.

Capt. John M. Fields, through the Pittsburg Steamship Co., has been able to bring about many needed reforms in the matter of compass equipment. Since taking hold of this work for the company Captain Fields has conducted a series of examinations similar to those of the compass office of the United States navy. All new compasses are tested for magnetic power, sensitiveness, pivotal action, lubber marks, needles set correctly to card, etc. A new compass that will not meet all these requirements is returned to the makers as N. G. An inventory of the old compasses in use is also taken and subjected to the same examination, and those found lacking in any of the essentials of a good working instrument are sent out for repairs. The compass is a most deceiving instrument to purchase by one inexperienced in such matters, and unless the purchaser subjects it to the examination as already stated, in nine cases out of ten he is going to get "stung." One can never tell by the looks—paint and polish make them look nice, but as these have nothing to do with the working principle of the compass one can not judge by this any more than to tell a man's character by the clothes he wears.

Another departure inaugurated by the company is the manufacture of all its own compensating binnacles, soft iron correctors and magnets. The binnacles are wooden and are of a design especially adapted for lake boats. All these things are made by the company's own workmen and as there is no middleman's profits, or opportunity for dishonest methods the company is assured of getting the very best article for the money. Not only this there is the satisfaction besides, which is worth more than the while. Another innovation is the careful manner in which the middle fore-and-aft line of every ship is found. This is a most important matter, and Captain Fields has lost no opportunity to impress this on the minds of masters. More trouble has been caused from misplaced lubber lines than can be imagined. The writer knows of several cases where vessels have been nearly lost or greatly damaged through want of attention to this highly important matter. Misplaced lubber lines are many times the real cause of a compass adjuster's troubles, and all the more so when he does not know where to look for the cause. This kind of error lies concealed, like a snake in the grass, and cannot be dragged to light by azimuths, as these observations, unless

treated in a mathematical manner reveal only the errors of the card, and not those of the bowl. Another great source of trouble is the carelessness in reshipping the compass bowl when temporarily removed from the binnacle for any purpose. It is usually put in at random by some one ignorant of the mischief that may accrue from their heedlessness. How often it occurs that when the wheelman is cleaning the outside of the compass that he will flop the bowl entirely over so that the after lubber-line will be forward and the forward one aft. The inexperienced would never detect the difference, and so far as looks goes even an experienced person could not tell. Nevertheless, a great mischief has been done, for the bearings (prongs on the side of the bowl) are made to fit the cups of the gimbal ring one way and unless this is done the compass will not work satisfactorily. The writer has gone aboard boats and seen the gimbal ring upside down in addition to the reversal of the lubber marks. Every master should pay strict attention to these matters and he should also do everything in his power to encourage and establish a routine that will eventually make these things impossible to occur. It can easily be done with a little interest and study. It would be a good idea to have the lubber marks of the same compass in different colors, the one to steer by in black, the after one in red, and the two athwartships in green. The only use of four lubber marks is the facility it affords in lining up the compass, etc.

THE INTERNATIONAL DATE LINE.

Where and what is the international date line?

The international date line is a line on which, by agreement among all the commercial nations of the world, it is agreed that the day shall begin. When it is noon at any meridian on the globe, it is midnight at the meridian exactly opposite. Hence, the necessity of a line which shall be considered the starting point. It is called the international date line because all the nations of the globe have agreed upon it. It follows the meridian of 180° in the main, with some variations to suit the wishes of the inhabitants of certain islands. It begins at the south pole, follows the 180th meridian north to a point opposite the southern cape of New Zealand, then turns northeast and follows a line parallel to the 180th meridian, leaving the Samoan islands on the east; then goes back to the 180th meridian, which

it follows to the north pole, with three minor variations, one of which is that the line passes through Behring Strait. If east of the line the day is Sunday; west of the line it is Monday; and ships, in crossing the line, change the count of the day. In other words, sailing westward, the navigator must skip a day, so that there will be a Sunday, or a Monday, etc., omitted in the log-book for that particular week, according to the day that the ship crosses. When sailing eastward, the navigator must reckon the day over again, so that there will be two Sundays, or Mondays, etc., in the log-book for that particular week, according to the date the ship crosses. This insures the ship keeping the Greenwich date on her return to port. If this were not done the ship's date would be a day ahead or behind the actual date. If no attention were paid to this important matter a vessel in circumnavigating the globe eastward would gain a day, and westward, would lose a day. Navigators use the 180th meridian and not the international date line, the date line being more in the interests of countries.

CONTRACTS TOTAL \$2,000,000.

Contracts have been placed with the Westinghouse interests by the French government for the equipment of the principal navy yards. The same company has also secured the contract for the installation of machinery for railroads in India, while in Scotch ship yards the company will also install new apparatus. The total of these contracts foots up more than \$2,000,000.

The work for the French government calls for complete plants for the operation of the navy yards at Cherbourg and Brest. The order was taken by the Societe Anonyme Westinghouse (the French Westinghouse company), but the equipment will be made in this country and shipped to French ports. The contract from India is for a complete lighting plant in the station of the East India railway at Delhi.

The work in Scotland calls for the complete electrical equipment of the Yarrow yards at Scotstown. Electricity for the operation will be taken from the Clyde Valley works, one of the largest of its kind in Great Britain, and which is equipped throughout with American apparatus. The current will be transmitted at 11,000 volts to the Yarrow works, where it will be stepped by huge transformers to 400 volts.

The Napier Ship Yards, Miller's Ship Yards, the Clyde Trust Ship Yards, the Coventry Ordnance Works, Scott & Co.'s Ship Yards, and those of the Beardmores have also ordered Westinghouse equipment.

COMMERCE OF LAKE SUPERIOR.

The annual report of L. C. Sabin, general superintendent, shows that the commerce of the Sault Ste. Marie canal has been the heaviest in its history, reaching the great total of 58,217,214 net tons, an increase of 6,466,134 net tons, or 12 per cent over 1906. There is noted a decided increase in traffic through the Canadian lock. During December 1,131,646 net tons were moved through the canal. The United States canal opened on April 23 and closed Dec. 11. The Canadian canal opened April 22 and closed Dec. 15. Following is the comparative statement for the seasons of 1906 and 1907:

Items.	Total Traffic.		Change.	
	Season 1906.	Season 1907.	Amount.	Per Cent.
Vessels:				
Steamers, number	18,138	17,245	893	— 5
Sailing, number	2,817	2,303	514	— 18
Unregistered, number	1,200	889	311	— 26
Total, number	22,155	20,437	1,718	— 8
Lockages, number	14,523	14,020	503	— 3
Tonnage:				
Registered, net	41,098,324	44,087,974	2,989,650	7
Freight, net	51,751,080	58,217,214	6,466,134	12
Passengers, number	63,033	62,758	275	...
Coal:				
Hard, net tons	1,011,375	1,506,668	495,293	49
Soft, net tons	7,728,255	9,893,427	2,165,172	28
Flour, bbls.	6,495,350	6,524,770	29,420	...
Wheat, bu.	84,271,358	98,135,775	13,864,417	16
Grain, bu.	54,343,155	43,463,338	10,879,817	— 20
Manufactured and Pig Iron, net tons.	391,105	307,941	83,164	— 21
Salt, bbls.	468,162	460,802	7,360	— 2
Copper, net tons	107,633	89,959	17,674	— 16
Iron Ore, net tons	35,357,042	39,594,944	4,237,902	12
Lumber, M. ft. B. M.	900,631	649,320	251,311	— 28
Building Stone, net tons	6,222	898	5,324	— 86
General Merchandise, net tons.	1,134,851	1,022,654	112,197	— 10

REIS BADLY INJURED.

The steamer Wm. E. Reis, of Mitchell & Co.'s fleet, which collided with the steamer Monroe C. Smith in the St. Clair river on Nov. 1 and was raised on Dec. 7 after continuous hard labor, is now in dry dock at the Ecorse yard of the Great Lakes Engineering Works undergoing repairs. The repair job of the Reis will be the greatest on the lakes during the winter, as it is not expected that she

will be ready for service before next March, although a big force of workmen are already working on her.

The steamer was practically broken in two while lying at the bottom of the river. Eighty-five hull plates and 40 tank top plates are to be removed, quite a number of them having to be replaced by new ones. The interior of the after cabins must be stripped of all the woodwork, the water having twisted the paneling out of position. There is a great hole on the port side of the steamer and a break in the deck which extends from the hatch clear down to the bilge. The bottom of the ship is pushed upward about 4 ft. for a distance of 75 ft., beginning forward of amidships. Above this

in two after adjusting the two parts to rebuild the portion which is so thoroughly destroyed.

Great praise is given to Chief Engineer Louis Minnie of the wrecked steamer for the excellent condition of the machinery. It is said that within two hours after the Reis was pumped out and was at the surface of the river, Engineer Minnie had the dynamo running and the electric lights burning. As soon as the water lowered in the boat he turned steam into the pipes, which were covered with asbestos, the heat drying the fire-proof covering, and saving an additional cost of placing the vessel in condition for service. The machinery is said to be in first-class condition.

CALENDARS.

The Whitman Manufacturing Co., general machinists, 178-180 Ohio street, Buffalo, have just issued a calendar to the trade for 1908. The pictorial part of this catalog is a reproduction of a photograph showing the steamers Hurlbut W. Smith and Wm. Nottingham on the beach upon which they were blown during the gale of Jan. 20, 1907.

F. H. Osborn & Co., marine insurance, 159 La Salle street, Chicago, Ill., have sent out a beautiful calendar to the trade, under the title of "The Last of the Frigates." The picture is a reproduction from an original photograph by Enrique Muller of the United States warship Monongahela, while starting out on her last voyage just outside of Sandy Hook, New York, Dec. 17, 1902. It is a very clear engraving tinted in blue and mounted upon a blue background, making a striking picture. The calendar is representative of the excellent taste displayed by Osborn & Co. annually in selecting subjects for their calendars.

THE DODD-ROGERS CO.

COMPASS ADJUSTERS

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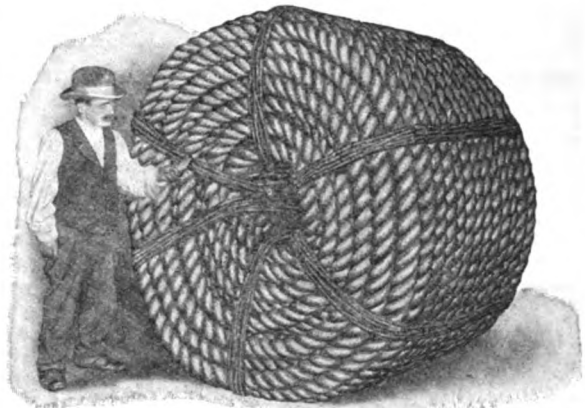
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This illustration shows a surveying instrument, possibly a theodolite or transit, in two parts. The upper part is the main body, which features a circular scale with degree markings and a central sighting mechanism. It is mounted on a vertical rod. The lower part is a separate base or mounting, which is a flared, bell-shaped structure with a central opening and four mounting holes at the base.

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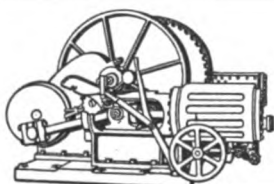
Canadian Branch: International Varnish Co., Ltd., Toronto



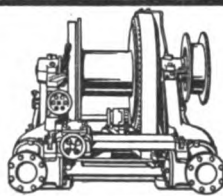
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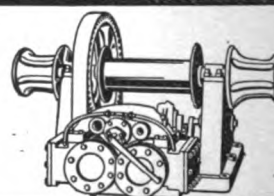
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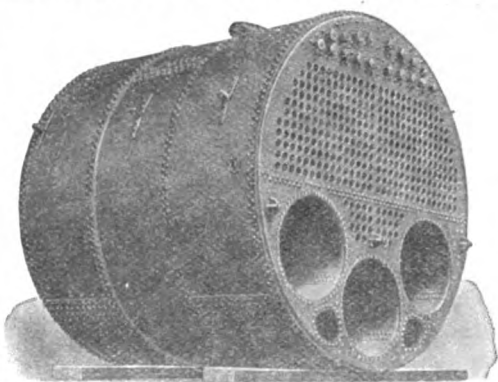
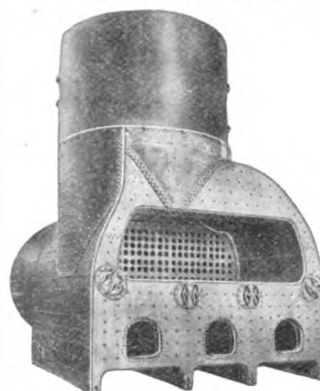


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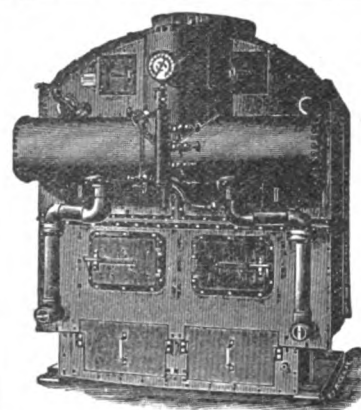
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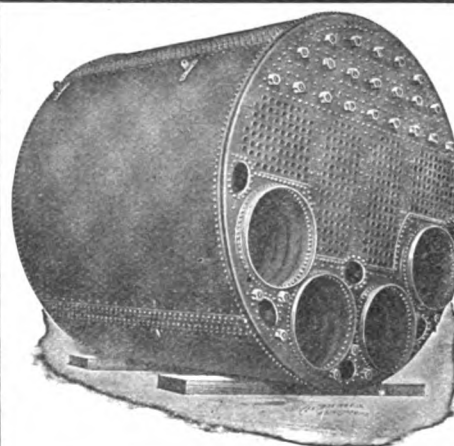
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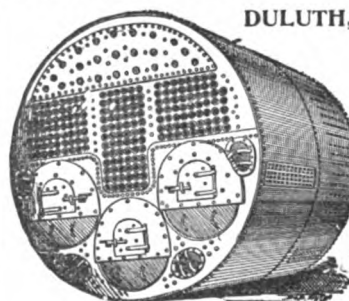
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U. S. Engineer Office, Detroit, Mich., December 16th, 1907. Sealed proposals for dredging Saginaw River, Mich., will be received at this office until 3 P. M. January 16, 1908, and, then publicly opened. Information furnished on application. Chas. E. L. B. Davis, Col. Engineers.

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